Gartner Lee Associates Limited

Consulting
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Geologists and
Hydrogeologists

Toronto - Buttonville Airport ■ Markham, Ontario ■ L3P 3J9 ■ 416-477-8400

OAKVILLE LANDFILL
1981 MONITORING PROGRAM

FOR

THE REGIONAL MUNICIPALITY OF HALTON

PROJECT 80-96-0

SEPTEMBER, 1982

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September 20, 1982

The Regional Municipality of Halton,
1151 Bronte Road,
Oakville, Ontario.
L6J 4Z3.

Attention: Mr. D.J. Corbett, P.Eng.

Dear Sirs:

Re: Oakville Landfill
1981 Monitoring Report
GLAL 80-96-0

We are pleased to submit our final report of the Oakville Landfill 1981 Monitoring Program for your review and comments.

Thank you for the opportunity to be involved in this project and if you have any questions please contact my office.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

Grant Anderson

E.G Anderson, P.Eng.,
Consulting Hydrogeologist.

RCD:jcm
Enclosure.

TABLE OF CONTENTS

PAGE

Letter of Transmittal

1.0 CONCLUSIONS AND RECOMMENDATIONS 1

2.0 INTRODUCTION 6

3.0 PROCEDURES 7

4.0 RESULTS AND DISCUSSION 10

  4.1 Background 10
  4.2 Ground Water 11
  4.3 Surface Water 17
  4.4 Leachate Collection System 25

APPENDICES

Appendix I - Borehole Logs
- Ground Water Monitor Construction Details
- Ground Water Elevations
- Hydrographs
- Surface Water Flows

Appendix II - Ground Water Quality Analyses
- Surface Water Quality Analyses
- Surface Water Bacteriological Analyses

Appendix III - Aquatic Macroinvertebrates

PAGE

LIST OF FIGURES:

FIGURE 1 - SITE PLAN 8
FIGURE 2 - WATER WELLS AND SURFACE WATER STATIONS 9
FIGURE 3 - WATER TABLE CONFIGURATION 12
FIGURE 4 - HYDROGRAPH BH 2 APPENDIX I
FIGURE 5 - HYDROGRAPH BH 8 " "
FIGURE 6 - HYDROGRAPH BH 10 " "
FIGURE 7 - HYDROGRAPH BH 11 " "
FIGURE 8 - HYDROGRAPH BH 12 " "
FIGURE 9 - SURFACE WATER QUALITY 21
FIGURE 10 - SURFACE WATER BACTERIOLOGICAL ANALYSES 22
FIGURE 11 - CHLORIDE CONCENTRATIONS IN SURFACE STREAMS 23
FIGURE 12 - UNIONIZED AMMONIA CONCENTRATIONS IN SURFACE STREAMS 24
FIGURE 13 - PRECIPITATION AND LEACHATE COLLECTION SYSTEM FLOWS 27

PAGE

LIST OF TABLES:

TABLE 1 - PROPOSED 1982 MONITORING STATIONS 5
TABLE 2 - SUMMARY OF GROUND WATER AND LEACHATE CONCENTRATION RANGES 13
TABLE 3 - GROUND WATER MONITOR CONSTRUCTION DETAILS APPENDIX I
TABLE 4 - GROUND WATER ELEVATIONS " "
TABLE 5 - SURFACE WATER FLOWS " "
TABLE 6 - GROUND WATER QUALITY ANALYSES APPENDIX II
TABLE 7 - SURFACE WATER QUALITY ANALYSES " "
TABLE 8 - SURFACE WATER BACTERIOLOGICAL ANALYSES " "
TABLE 9 - AQUATIC MACROINVERTEBRATES APPENDIX III

1.0 CONCLUSIONS AND RECOMMENDATIONS:

1.1 CONCLUSIONS:

Based on the findings of the 1981 monitoring program the following conclusions are drawn.

- Some leachate springs exist along the south toe of the landfill and to a lesser extent along the north-western toe. This appears to be related to ground water level changes which occurred between 1980 and 1981. During this time the south arm of the toe-drain was dug up to investigate a problem and then backfilled. The existing leachate springs will likely subside when the toe-drain is reconstructed in 1982. If continued monitoring indicates that reconstructed toe-drain has not alleviated this probelm then appropriate remedial measures will be recommended.

- Leachate discharges have affected the bacteriological and chemical water quality in the tributary streams directly adjacent to the landfill. However the stream recovers to background levels within 500 m and well before it discharges into Oakville Creek.

- The survey of aquatic life confirmed the results of the chemical and bacteriological monitoring program. While the bottom fauna association found in close proximity to the site was typical of organically enriched waters, downstream recovery was rapid. No effect was evident on Oakville Creek.

- The natural ground water quality in the underlying shale bedrock is highly mineralized and of naturally poor quality. The large quantities of dissolved solids present have caused analytical interferences in the analysis of chemical oxygen demand and reduced nitrogen parameters.

- Landfill leachate recharges the ground water flow system in the shale bedrock and migrates to discharge points along the nearby tributary streams. We have not defined the exact extent of the leachate plume due to the lack of ground water monitors on the property immediately south (downgradient) of the landfill. Ground water flow calculations suggest a plume may extend approximately 60 m south of the landfill. However, water level and water quality data from a monitor near the stream, which runs along the south property boundary of the site, suggests that the plume may not extend past the stream due to upward hydraulic gradients.

- The nearest water wells downgradient from the landfill are located near Highway 5 about 1000 metres south of the landfill and hence are too far away to be affected by the landfill. One of the residential wells sampled in 1981 exceeded the M.O.E. drinking water criteria for nitrate. Farms, domestic septic systems and excessive fertilization are common causes of nitrate contamination.

1.2 RECOMMENDATIONS:

Based on the findings of this study we recommend that,

1) The monitoring program be continued but reduced in frequency as follows.

   a) Four times per year
      - Sample the 5 tributary surface water stations.
      - Take ground water elevations in all monitors.
      - Sample leachate from the toe-drain collection system.

   b) Once per year (reduced from twice per year)
      - Sample and analyze ground water quality in the monitors and private water wells listed in Table 1.

   c) Sampling of Oakville Creek would be discontinued because results to date have indicated no impact.

   d) The monitoring parameters would remain the same as November 1981 (see Appendix II).

2) The monitoring data in 1982 should be used to determine if the reconstructed toe-drain has reduced the effect of leachate springs. The need for further action will be determined based on this information.

3) The owners of the private water wells with the high

nitrate levels be contacted by the health department about its significance and appropriate remedial actions.

TABLE 1: Proposed 1982 Monitoring Stations:

Surface Water - (4 times annually)

SW1, SW2, SW3, SW4, SW5.

Ground Water Monitors - (once annually)

BH 1-I, 1-II
BH 3-I, 3-II
BH 4-I, 4-II, 4-III
BH 5-I, 5-II, 5-III
BH 8-I, 8-II
BH 10-I, 10-II, 10-III
BH 15-I, 15-II, 15-III, 15-IIII, 15-IIIII
BH 16-I, 16-II, 16-III, 16-IIII
BH 17-I, 17-II
BH 18-I, 18-II
BH 19-I, 19-II
BH 20-I, 20-II

Private Off-site Water Wells - (sampled once annually by Halton Regional staff - see Figure 2 for locations)

W 1
W 2
W 13
W 14

Leachate - Pumping Station

(4 times annually)

2.0 INTRODUCTION:

This report describes the monitoring of ground water and surface water carried out at the Oakville landfill site during 1981. The program was designed to fulfill portions (a) and (f) of Condition No. 4 of Certificate of Approval No. A210402.

This long term monitoring program began in August 1980 and is ongoing. The purposes of the study are as follows:

- to assess the impact of landfill leachate on ground water quality in the vicinity of the site,
- to determine if private wells downgradient from the landfill have become contaminated or are about to become contaminated,
- to assess the impact of overland and subsurface leachate flows on water quality in local streams,
- to monitor the effectiveness of the leachate collection-recharge system.

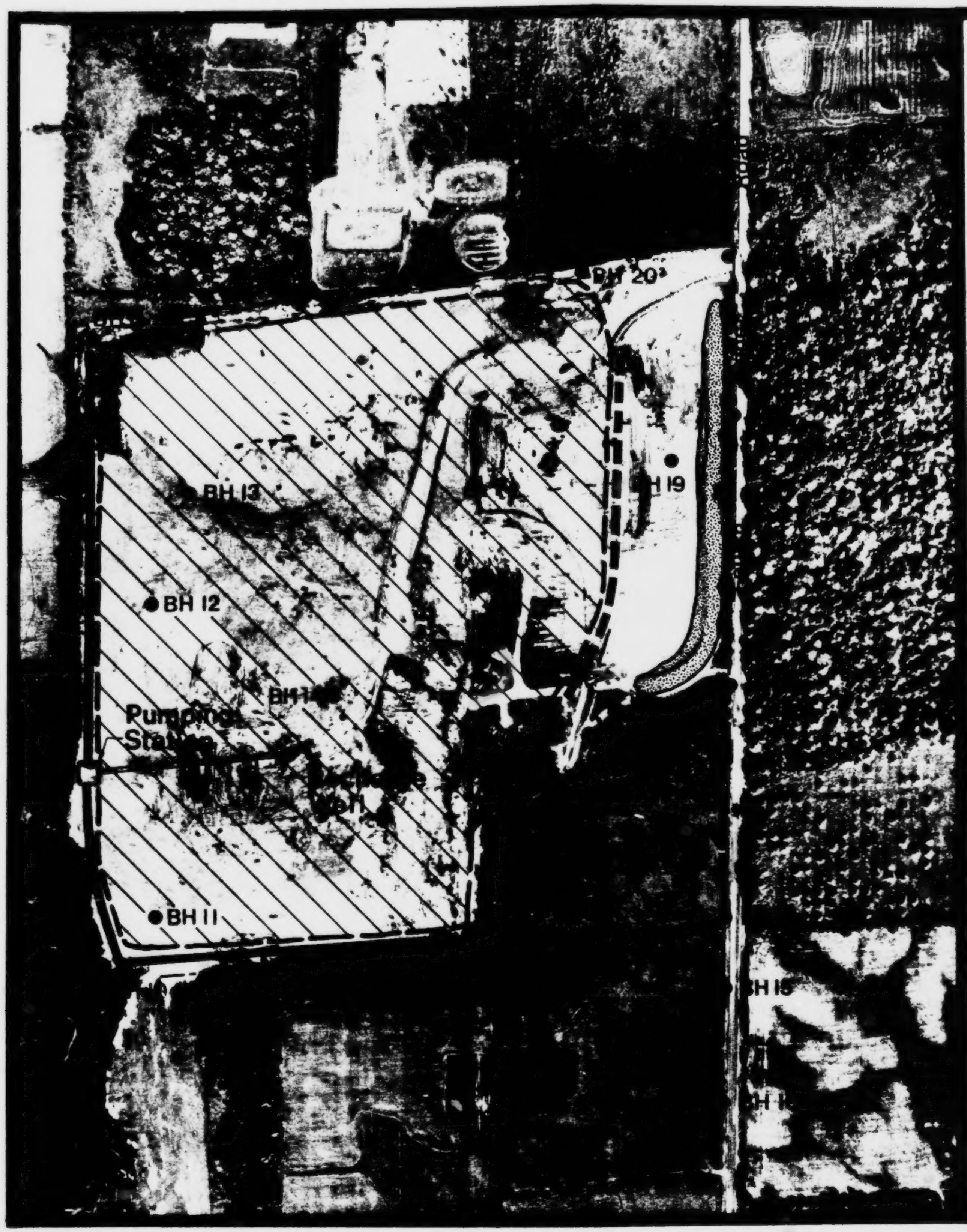
Previous reports on this site by Gartner Lee Associates include "Hydrogeological Study, Oakville Landfill Site, January, 1980" and "Oakville Landfill Site Monitoring Program - Interim Report, June 1981".

3.0 PROCEDURES:

Ground water samples were collected in April and again in November 1981 from selected monitors. A stainless steel bailer or a vacuum pump was used for sample collection. Ground water monitor locations are shown in Figure 1.

Surface water samples were collected in February, April, May, September and November 1981. Surface water stations are presented in Figure 2. Surface water flows were estimated and ground water levels were measured during all four site visits. Observations of leachate springs and general site conditions were also made.

In September 1981, the site was visited by an aquatic biologist to determine possible effects of landfill discharges on aquatic life in the adjacent surface streams and Oakville Creek. Qualitative samples of bottom fauna organisms were collected and identified in the field at all suitable surface water stations. As well, observations on surface water use and stream bottom fouling and iron staining were made during this field visit.



Legend **Fig. 1**

▨ Refuse (estimated extent by site closure)

▒ Berm

●BH 1 Gartner Lee Borehole Location & Designation

▬ Existing Toe - Drain

╍ Proposed Toe - Drain Extension

Stream

Property Boundary

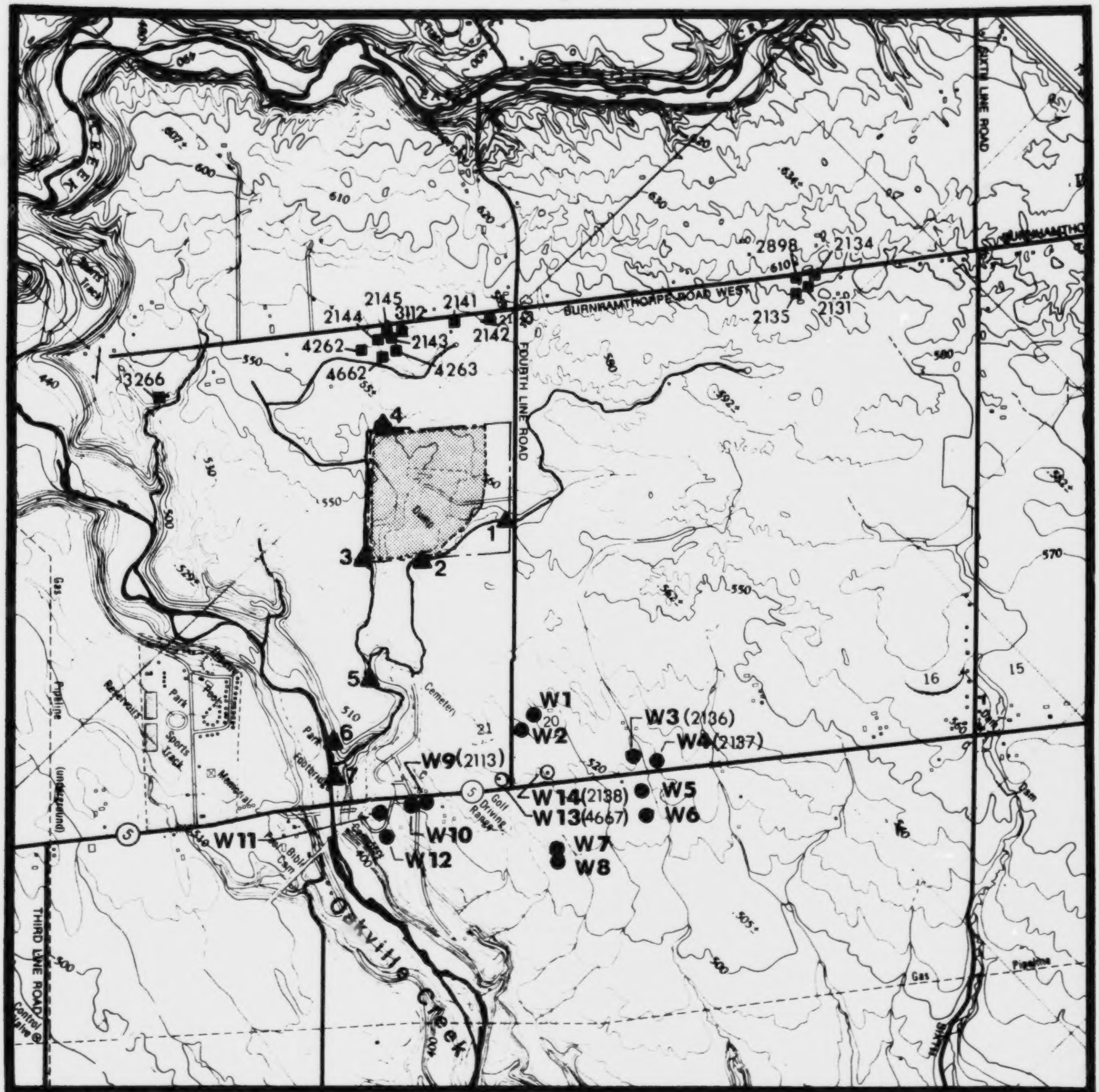
Approximately 1cm = 45m

Site Plan

HALTON REGION
OAKVILLE LANDFILL SITE

Project 80-96

Gartner
Lee
Associates
Limited



○**W13** (2138) Water Well Location and M.O.E. Designation (Sampled 1981)

●**W1** (2113) Water Well Location and M.O.E. Designation (Sampled 1980)

■2141 Water Well Location and M.O.E. Designation (Not Sampled)

▲7 Surface Water Monitor Station

Surface Water Courses

▨ Oakville Landfill Site

Water Wells and Surface Water Stations

2

Halton Region

Oakville Landfill Site

Scale 1:25,000 1 Km

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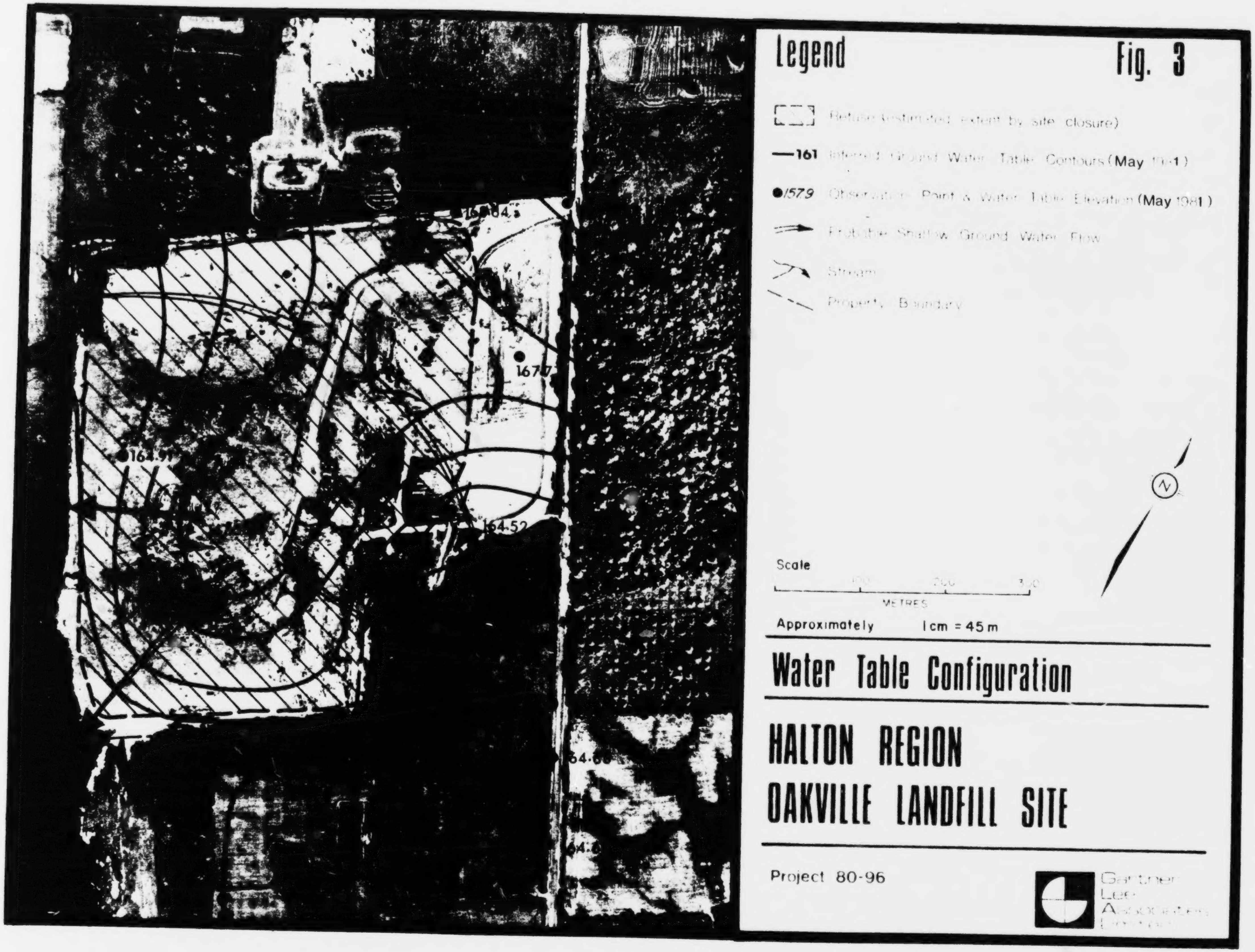

Legend
Refuse (estimated extent by site closure)
—161 Inferred Ground Water Table Contours (May 1981)
●1579 Observation Point & Water Table Elevation (May 1981)
Probable Shallow Ground Water Flow
Stream
Property Boundary
Scale
100
200
300
METRES
Approximately 1cm = 45 m
N
164.52
167.7

Fig. 3

Water Table Configuration

HALTON REGION
OAKVILLE LANDFILL SITE

Project 80-96

Gartner Lee Associates Limited

4.0 RESULTS AND DISCUSSIONS:

4.1 BACKGROUND:

The Oakville Landfill is located east of Oakville Creek and between Burnhamthorpe Road and Dundas Street (Highway 5). The landfill has been built over an undulating till plain that covers red Queenston shale bedrock at shallow depths.

Two tributaries of Oakville Creek border the east and west perimeters of the landfill. These are intermittent drainage channels which flow south and enter Oakville Creek about 900 m downstream.

The landfill has been in operation for about 20 years and the fill is approximately 6 m above the surrounding countryside.

More than three quarters of the site area has been filled and has received final cover.

Methane gas is generated by decomposing refuse in the landfill. However, this gas is unable to migrate more than a few metres through the dense, low permeability silt till soils and shale bedrock at this site. The creeks and drainage ditches which surround the landfill also form barriers to gas migration. No conventional gas monitoring is required at this time because there is no potential for significant lateral gas migration, and there are no buildings adjacent to the landfill.

4.2 GROUND WATER:

All ground water elevation measurements made to date are presented in Appendix I. Figure 3 shows the water table configuration and lateral ground water flow directions as of May 1981. Regional ground water flow is generally to the south-west towards Oakville Creek. Ground water velocities in the shale were calculated to be in the order of one to ten metres per year. A ground water mound exists within the landfill which causes outward radial flow near the landfill. Flow rates in the deep shale are sluggish and deep ground water is naturally saline. Figures 4 to 8 are representative hydrographs which show the seasonal water level variations and also demonstrate the vertical hydraulic gradients. Downward gradients are observed from the landfill down into the shale directly below the landfill (see Figures 7 and 8). However upward gradients are observed along the toe of the landfill (see Figure 5). The low permeability of the deep shale causes leachate to move radially outward from the landfill and discharge at springs along the toe of the landfill. A toe-drain has been installed to prevent these discharges.

Landfill leachate contains a number of dissolved and suspended organic and inorganic constituents. Table 2 lists the concentration ranges for "raw" leachate samples taken

TABLE 2: Summary of Ground Water and Leachate Concentration Ranges - Oakville Landfill.

	'Raw' Leachate (12-II, recharge pit)	Background Shallow Ground Water (1-I, 2-I, 3-I)	Background Deep Saline Ground Water (15-I, 15-II)
Conductivity	5,000-15,000	1,900-2,200	10,000-40,000
Hardness ($CaCO_3$)	4,000- 8,000	800- 900	2,000- 8,000
Alkalinity	4,000	326	40- 120
Chlorides	1,000- 1,200	200- 300	3,000-15,000
Sulphates	50- 250	500- 600	500- 3,000
Sodium	1,000	177	2,000- 6,000
Total Kjeldahl Nitrogen (M)	300- 500	< .4 - .8	3-30
Free Ammonia (N)	250- 350	< .1 - .1	1-30
Total Phosphorous (P)	1-3	.04-.15	.24-1
BOD	500-20,000	<5	1-32
COD	9,000-34,000	10-40	40- 800

directly from the refuse or the leachate collection-recharge system. These ranges are typical of southern Ontario leachates and show the presence of high levels of electrical conductance, chlorides, hardness, total Kjeldahl nitrogen, ammonia, phenols, BOD and COD.

Table 2 also lists concentration ranges of "saline" water from deep on-site piezometers. Note that many inorganic parameters in the "saline" water such as chloride, greatly exceed the concentration range in landfill leachate. In other words the inorganic water quality of the landfill leachate is of better quality than the deep natural ground water in the shale.

Note that the "saline" water also has high COD, total Kjeldahl and ammonia nitrogen values. These are often inidcators of leachate contamintation. We would not expect to find leachate contamination in saline ground water. In Ontario saline ground waters generally exist in very old sluggish ground water flow systems. These flow systems are usually isolated from precipitation infiltrating from surface, by low permeability geologic strata such as shale. If they were not isolated, fresh recharge would rapidly flush out and dilute the natural salts. If a saline ground water flow system is isolated from surface recharge it would also be protected from surface contaminant sources such as the landfill.

In the past we could not explain the high levels of COD, total Kjeldahl nitrogen and ammonia nitrogen in deep saline ground water samples from this site. Literature research and discussions with the MOE laboratory this year, have revealed that high levels of chloride can cause positive analytical interference in the analysis of COD. Similarly high levels of calcium can interfere with the analysis of total Kjeldahl and ammonia nitrogen. Thus it is quite possible that the reported high concentrations of COD, TKN and $NH_3(N)$ do not actually exist in the deep saline ground water samples.

Samples from monitors 15-I, 15-III and 16-I were analyzed for PCBs and organochlorine pesticides to determine if these toxic contaminats were migrating southward from the landfill. No PCBs or organochlorine pesticides were detected in any of these three wells.

There is a strong upward gradient in borehole 17, located beside the tributary stream in the wetlands just south of the landfill. The water level in the deep piezometer was above ground surface each time it was measured. The water in both the deep piezometer and the shallow standpipe has chloride concentrations of about 8,000 mg/L indicating that deep saline ground water is discharging upwards into the low wetlands area. This discharge zone may prevent leachate from migrating southward under the stream.

Monitor 5-II is immediately downgradient from the landfill and is undoubtedly affected by landfill leachate. Note that the chloride levels (about 1000 mg/L) and calcium levels (160 mg/L) are not high enough to cause analytical interferences but there are elevated levels of COD (600 mg/L), BOD (50 mg/L) ammonia and total kjeldahl nitrogen (150 mg/L) and alkalinity (1000 mg/L). This is typical of partially renovated landfill leachate which has moved a short distance through the shale bedrock.

Two water wells, which supply private residences at the corner of Highway 5 and 4th Line were sampled and analyzed for water quality. These wells are shown on Figure 2 as W13 (4667) and W14 (2138), and are approximately 1000 m south of the landfill. Ground water flow calculations indicate that the landfill leachate plume probably only extends 60 metres from the landfill. In fact water quality and level data collected in 1981 suggest that the leachate plume may not even extend past the tributary stream which runs along the landfill's southern property boundary. These wells have generally acceptable water quality and are too far away to be affected by the landfill.

The well on the north-east corner of 4th Line and Highway 5, (W14 (2138)), does however have nitrate concentrations (17.5 mg/L) in excess of the M.O.E. drinking water criteria (10 mg/L). Farms, residential septic systems and excessive lawn fertilizing are potential sources of nitrate contamination. The residents have been contacted by the Halton Regional Health Department concerning this matter.

4.3 SURFACE WATER:

Surface stream flow estimates are presented in Appendix I and surface water quality and bacteriological analyses are in Appendix II. The stream tributaries adjacent to the landfill are intermittent and do not flow during dry seasons. Sampling locations along the two tributary creeks and Oakville Creek are shown in Figure 2.

Leachate springs were observed discharging along the south toe of the landfill during 1981. Leachate staining and minor springs were also observed to the north-west. Figures 9 and 10 show that these discharges degraded surface water quality in September 1981 at stations SW2 and SW3 in the tributary streams adjacent to the landfill. However, the stream appears to recover to background levels by the time it reaches station SW5 500 metres downstream.

Due to assimilation and dilution within the feeder tributary and the large dilution capacity available in Oakville Creek, no impact from the landfill on Oakville Creek has been detected to date.

Figures 11 and 12 are plots of chloride and un-ionized ammonia concentration in the surface streams versus time. These figures show water quality seasonal trends. Note that at SW2 and SW3 concentrations in excess of the M.O.E. guidelines sometimes occur during low flow periods however during high flows (February and November, 1981) the leachate is diluted to acceptable levels. Note that SW5 concentrations and trends are similar to the upstream background station SW1. High chloride concentration may be due to discharge of naturally saline ground water in the stream as well as leachate discharges.

Figure 10 shows the 1981 geometric means of bacteriological analyses for surface water. Stations SW1 (upstream), SW2, SW3 and SW4 (adjacent to the landfill) all exceed the M.O.E. limit of 1000 total coliforms per 100 ml. Station SW5 downstream of the landfill has acceptable bacteriological levels. Station SW2 also slightly exceeds the M.O.E. objective of 100 counts per 100 ml for fecal coliforms.

It appears that the landfill has some bacteriological impact on the tributaries, however, the upstream sample (SW1) is only slightly better. The stream seems to recover downstream before station SW5. It should be noted that horse-back trail riding occurs along the lower portions of the tributary creek valley and this could also cause bacteriological degradation.

Results of the biological survey of the area streams in September 1981 are provided in Appendix III. Effects of leachate discharge from the site on aquatic life nearby as well as possible visible effects on the stream bottom are discussed here.

At Station 1 upgradient from the site, streamflow was virtually non-existent and no biological sampling was performed. However, a conductivity of 700 µS and a dissolved oxygen concentration of 6 mg/L @ 13°C determined in a small pool at Station 1 can be regarded as typical of background conditions.

Downstream at the south-central flank of the landfill

(Station 2), the bottom fauna population was dominated by pollution-tolerant sludgecorus and mosquitoe larvae. However, the occasional presence of less tolerant mayflies and clams (Sphaerium) indicated that organically enriched rather than toxic conditions prevailed. Flows were still too small to measure and conditions were therefore essentially stagnant. Dissolved oxygen levels fell to 3 mg/L @ 13°C and conductivity levels doubled to 1400 µS.

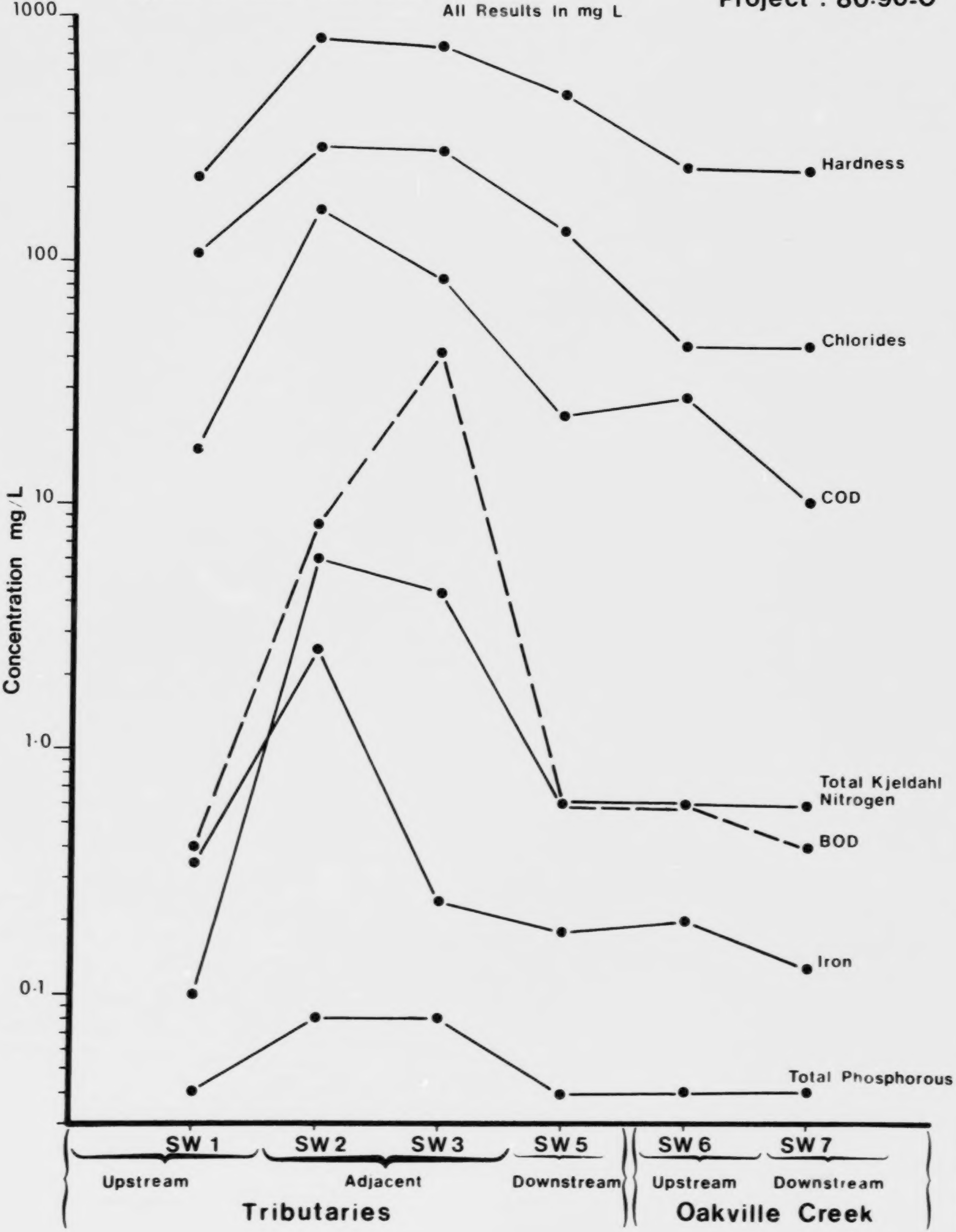
At Station 3 near the southwest corner of the site, aquatic life was scarce. Only single specimens of midge (Chironomidae) in the larval and pupal stages were found. The stream bottom was founded on smooth shale at this location and this, in combination with only a trickling flow was judged as a major reason for the paucity of aquatic life. A dissolved oxygen level of 4 mg/L @ 12°C and a specific conductance of 1425 µS were recorded. Upstream at the northwest corner of the site, flow was non-existent in the roadside ditch and inadequate volume was available in the small separated pools to allow sampling.

Station 5 was located immediately below the confluence of the two tributaries draining the east and west flanks of the landfill site. A flow of roughly 1 L/s was measured during the September sampling run. The bottom fauna association was composed of four major groups including at least two species of caddisfly. These results indicated that considerable improvement had occurred over conditions upstream at Station 2. We measured a dissolved oxygen level of 8.5 mg/L @ 13°C and a specific conductance of 875 µS.

In Oakville Creek both upstream (Station 6) and downstream (Station 7) of the tributary draining the landfill, clean-water forms dominated the bottom fauna associations. Mayfly and caddisfly larvae were well represented and a good variety of life was found. Dissolved oxygen levels were high (12 and 13 mg/L) and specific conductance was a constant 460 uS. The natural assimilation of the small volume of contaminated water leaving the landfill site before it reaches Oakville Creek and the large dilution provided by Oakville Creek itself account for the lack of effect on the life and chemistry of the larger stream.

Figure 9: Surface Water Quality (September, 1981)
All Results In mg L

Project : 80-96-0



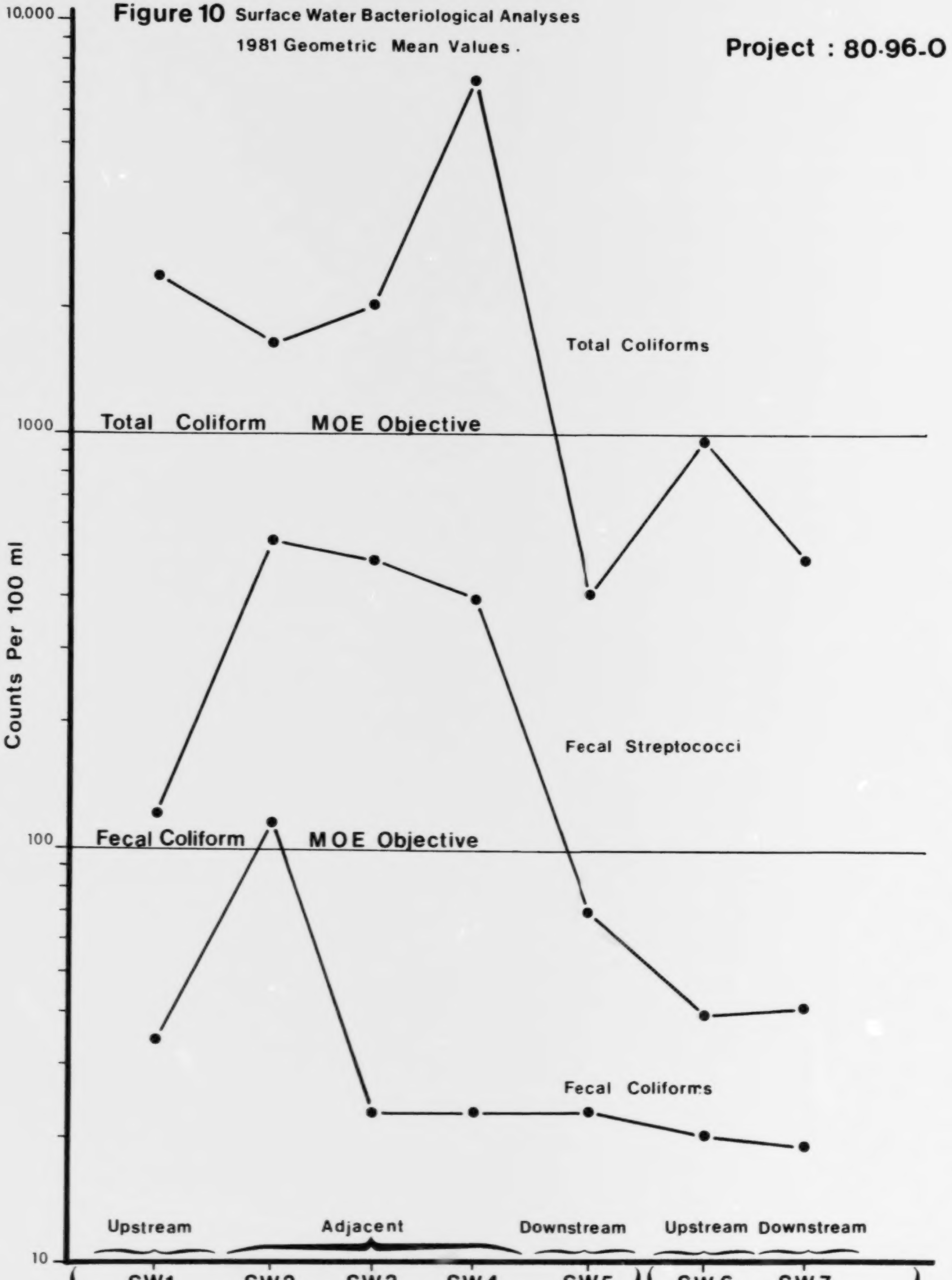


Figure 10 Surface Water Bacteriological Analyses 1981 Geometric Mean Values.

Figure 11

Concentration Of Chloride In Surface Streams Versus Time

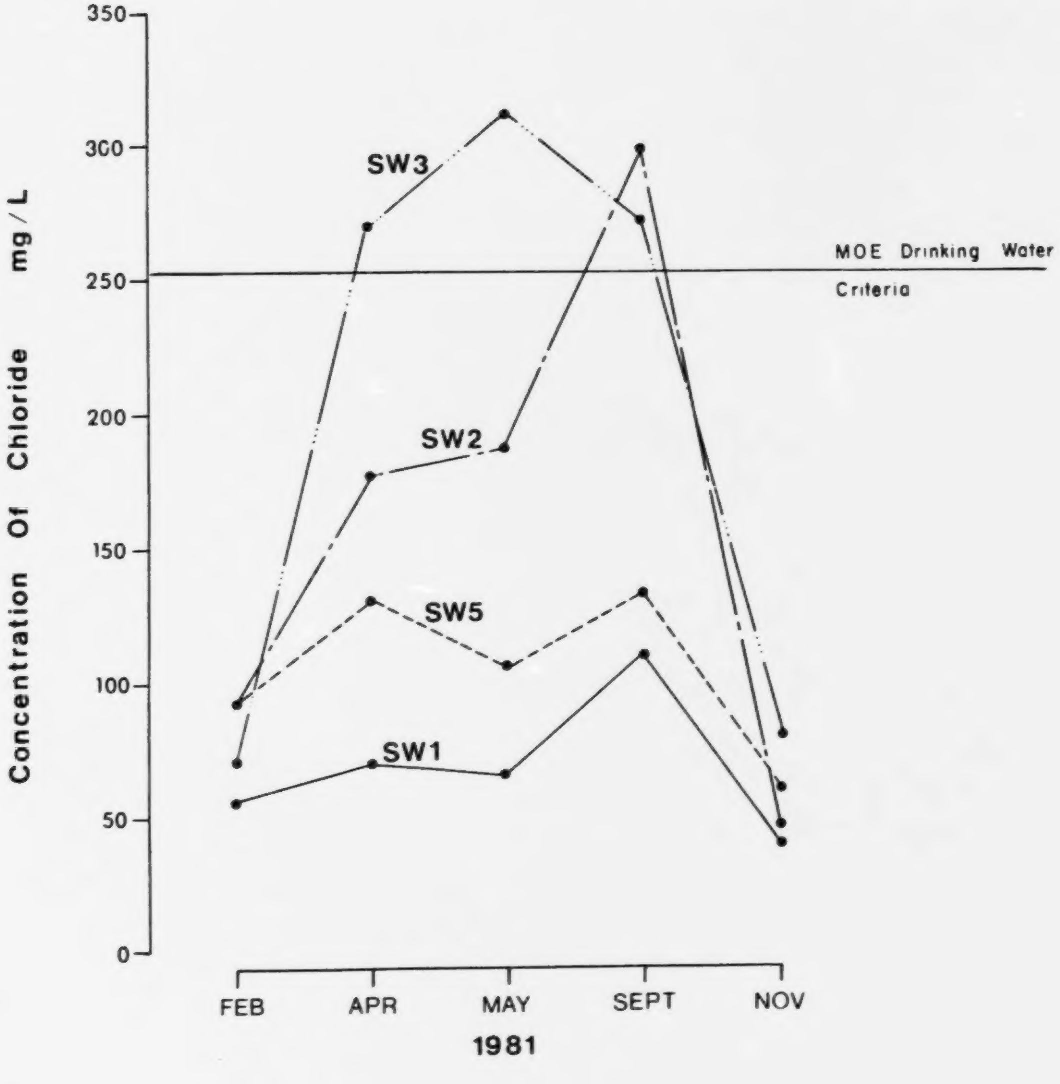
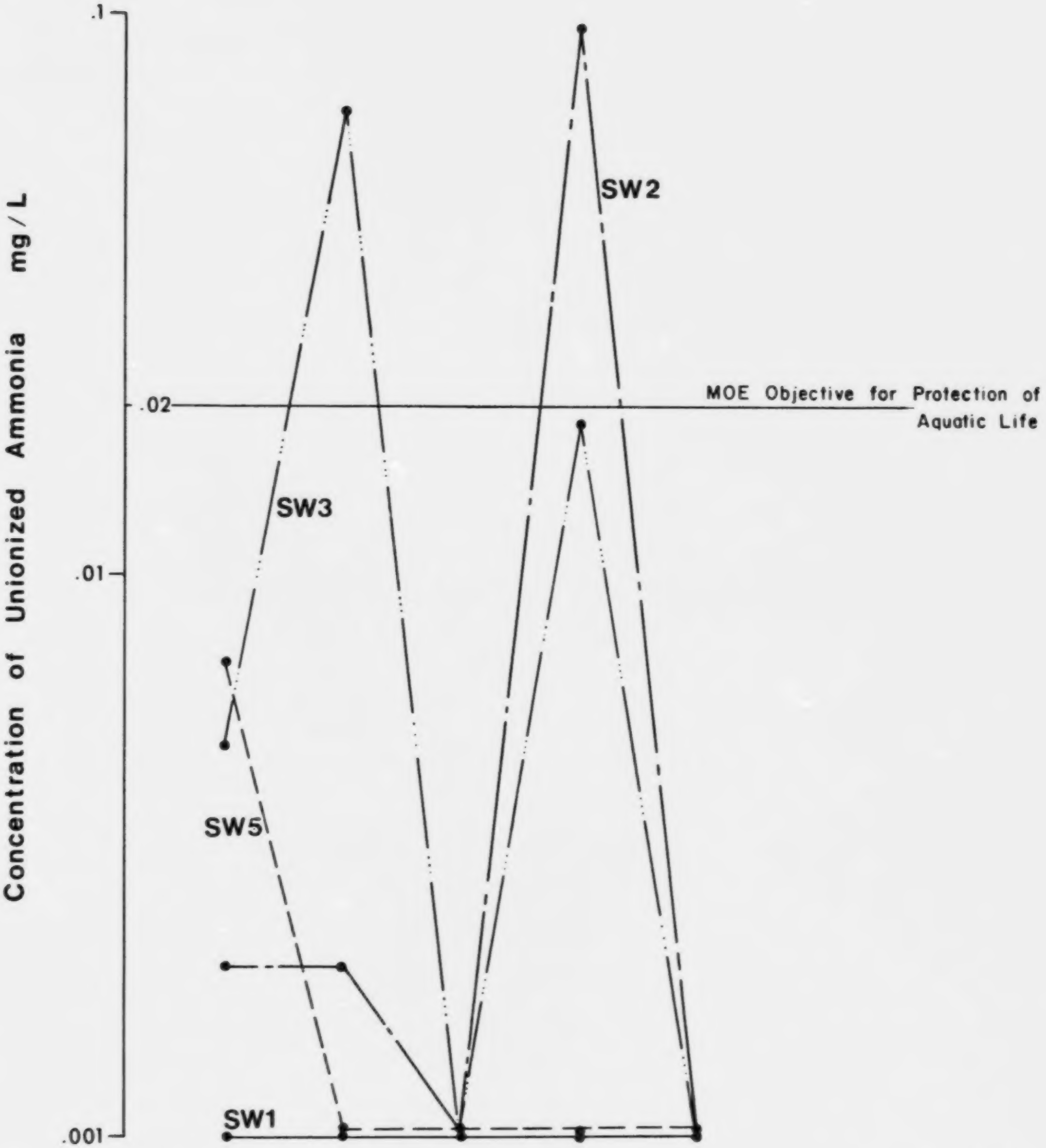


Figure 12

Concentration Of Unionized Ammonia In Surface Streams Versus Time



4.5 LEACHATE COLLECTION SYSTEM:

There is a toe-drain leachate collection system which runs along the west and south sides of the landfill. (See Figure 1). Leachate flows to a pump house along the west side and then is pumped up to a recharge pit on top of the landfill. The purpose of this system is to protect the adjacent surface water streams from leachate spring discharges along the landfill toe. At present the toe-drain has been dug up along the south side and is not operating properly. The toe-drain will be reconstructed and extended along the east side of the landfill in 1982. The system is not designed to prevent downward movement of leachate into the shale bedrock.

During 1981 leachate discharges were observed along the north-east toe of the landfill near BH 8. The hydrograph for BH8 (Figure 5) shows that the water levels measured in BH8 monitor 1 were higher in 1981 than in 1980. Water levels in this 9 m deep piezometer were generally above ground surface indicating discharge conditions.

Leachate springs were also observed in September of 1981 near BH10 at the south-west corner of the landfill. The hydrograph for BH10 (Figure 6) shows that the water table elevation rose nearly two metres between December 1980 and November 1981. This high water level accounts for the occurrence of leachate springs in this area.

The increased upward gradients along the landfill toe are probably due to the broken section of toe-drain along the southern perimeter. The draining effect of the toe-drain kept water levels lower in 1980 when it was operating properly.

Figure 13 is a bar graph of precipitation and pumping flows from the leachate collection system in 1981. Leachate flows were highest in February when we had a warm spell with a lot of rain and melting of snow. Leachate flows were also high in October and November when there was significant rain and cool temperatures which reduce the effect of evapotranspiration. The rest of the year flows are fairly constant around 500 m^3 per month.

A water budget was prepared for the 1979 hydrogeological report based on the 15 year normal weather data obtained from the Oakville South-East Climatological Station. The potential evapotranspiration was calculated using the Thornthwaite Method. The following is a summary of the results,

Average Annual Total Precipitation	.. 80.2 cm
Average Annual Potential Evapotranspiration	.. 59.9 cm
Potential Water Surplus	.. 20.3 cm

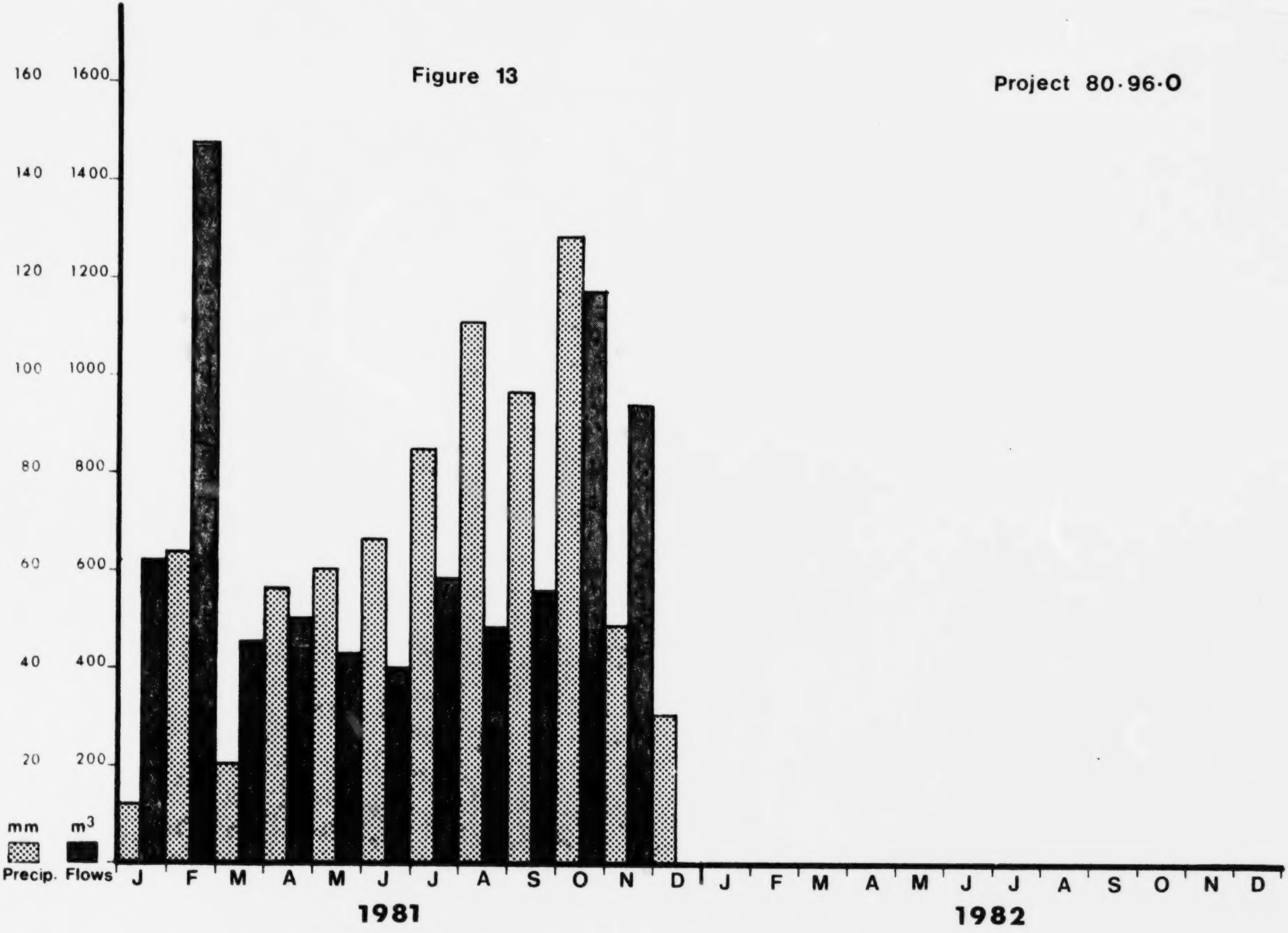
The total precipitation in 1981 was 78.3 cm.

In this area the actual evapotranspiration is about 10 cm less than the potential calculated by the Thornthwaite Method. Thus the actual annual water surplus available for infiltration and run-off is about 30.3 cm on the average.

On the one quarter of the site (7 hectares) which is still

Figure 13

Project 80·96·0



Oakville Landfill Site – Precipitation (mm) And Flows From Leachate Collection System (m^3)

being filled we estimate that infiltration rates are 40 cm per year due to the lower run-off coefficient and evapotranspiration losses than at a completed operation. This infiltration rate equates to about 7.6 litres per minute per hectare. On the area which has already received final cover (approximately 21 hectares) we estimate the infiltration rate should be around 10 cm or 1.9 litres per minute. Thus the total infiltration on the site, which approximately equates to the total site leachate production, is

(7 hectares x 7.6 L/min per hectare) + (21 hectares x 1.9 L/min per hectare) = 93.1 L/min or 48,933 m^3/year.

Total volume of leachate pumped for the period December 4th, 1980 to December 2nd, 1981 was 208.9 hrs x 40.8 m^3/hr = 8523 m^3. Thus at least $(\frac{48,933\ m^3 - 8523\ m^3}{48,933\ m^3} \times 100) = 82.6\%$ of the calculated annual leachate production enters the ground water flow system or discharges at surface. Ground water flow calculations indicate that more than 85% of the total leachate produced is capable of exfiltrating into the shale bedrock below the site. Due to the recycling nature of the recharge system and the lack of steadily increasing pumping volumes over the year we suspect that nearly all of the leachate produced annually is lost from the system. Further monitoring is required to confirm this hypothesis.

Respectfully submitted
GARTNER LEE ASSOCIATES LIMITED

E.G. Anderson, P.Eng.
Principal-In-Charge

R.C. Dickin, B.Sc., M.Sc.
Hydrogeochemist

APPENDIX I

BOREHOLE LOGS

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance 'N' - The number of blows required to advance a standard split spoon sampler 30 cm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 75 cm.

Dynamic Penetration Resistance - The number of blows required to advance a 5 cm, 60 degree cone, fitted to the end of drill rods, 30 cm into the subsoil, the driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described as follows:

Consistency	'N' Blows / . 3 m	Denseness	'N' Blows / . 3 m
Very Soft	0-2	Very Loose	0-4
Soft	2-4	Loose	4-10
Firm	4-8	Compact	10-30
Stiff	8-15	Dense	30-50
Very Stiff	15-30	Very Dense	> 50
Hard	> 30		

W.T.P.L. - Wetter than Plastic Limit
D.T.P.L. - Drier than Plastic Limit
A.P.L. - About Plastic Limit

DESCRIPTION OF ROCK

$$\% \text{ Recovery} = \frac{\text{Total Length of Core Recovered/Run}}{\text{Total Length of Drilling Run}} \times 100$$

TYPE OF SAMPLE

SS - Split Spoon
AS - Auger Sample
ST - Shelby Tube Sample
BX - Rock Core 42 mm ø

SYMBOLS

▲ - Water Table Monitor (Standpipe Tip)

● - Piezometer Tip

BOREHOLE NO. 1

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE FEB. 19, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 170.9 m
TECHNOLOGIST L.L.

DEPTH (m) 0.0	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
		GLACIAL TILL Medium brown silt till, dense to very dense, fractured, moist, saturated from 1.0 m	SS	18	15			
			SS	41	12			
			SS	78	6			
2.4								
		SHALE Red, with green bands, cryptocrystalline, medium to thinly bedded shale						
			BX			100	▲	4.1 m tri-cone 4.2 m BX Core
							●	
9.5								
		Borehole terminated at 9.5 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 2

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE FEB. 19, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 169.7 m
TECHNOLOGIST L.L.

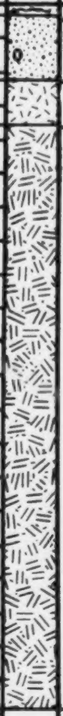
DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
0.0								
0.2		TOPSOIL	SS	26	21			
		GLACIAL TILL Medium brown, silt till, fractured, dense to very dense, moist.						
			SS	56	7			Sample #2 1.2-1.7 m 6% gravel 16% sand 58% silt 20% clay
2.0		WEATHERED SHALE Red brown weathered shale-hard, saturated.	SS	65/.1m	8			
2.9			SS	60/.2m	4			
		SHALE Red Queenston shale.					▲	
							●	Augered to 12.2 m
							●	
12.2		Borehole terminated at 12.2 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 3

PROJECT NAME	OAKVILLE LANDFILL SITE	**PROJECT NO.**	78-93
CLIENT	M. M. DILLON LIMITED	**DATE**	FEB. 21, 1979
BOREHOLE TYPE	CME 75, 0.1 m I.D. Hollow Stem Augers	**GEOLOGIST**	D.E.J.
ELEVATION	167.0 m	**TECHNOLOGIST**	L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/ 0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0.0								
0.2		TOPSOIL	SS	22	20			
		GLACIAL TILL Red brown silt til fractured, moist.						
1.2		SHALE - TILL COMPLEX Mixed red shale and silt till, moist	SS	65/ .2m	5			
1.7		SHALE Red Queenston shale					▲	Augered to 10.4 m
10.4							●	
		Borehole terminated at 10.4 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 4

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE FEB. 22, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 165.3 m
TECHNOLOGIST L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/ 0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0.0								
0.2		TOPSOIL	SS	9	11			
		GLACIAL TILL Grey silt till, fractured, saturated	SS	29	10			
1.0			SS	77	7			
		SHALE Red with green bands, cryptocrystalline, medium bedded shale.	SS	68/ .2 m	5			Augered to 7.0 m
							▲	
							●	
			BX			100		— 7.0 m BX Core
			BX			100		
							●	
12.8		Borehole terminated at 12.8 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 5

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE FEB. 27, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 164.9 m
TECHNOLOGIST L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0.0		EARTH FILL						
0.2		REFUSE Mixed paper, wood, metal, plastic, concrete, saturated from 0.8 m±						Augered to 4.7 m
4.3		SHALE Red with green bands, cryptocrystalline, medium bedded shale	BX			100	▲ ● ●	4.7 m BX Core
13.7		Borehole terminated at 13.7 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 8

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE MARCH 8, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 164.3 m
TECHNOLOGIST L.L.

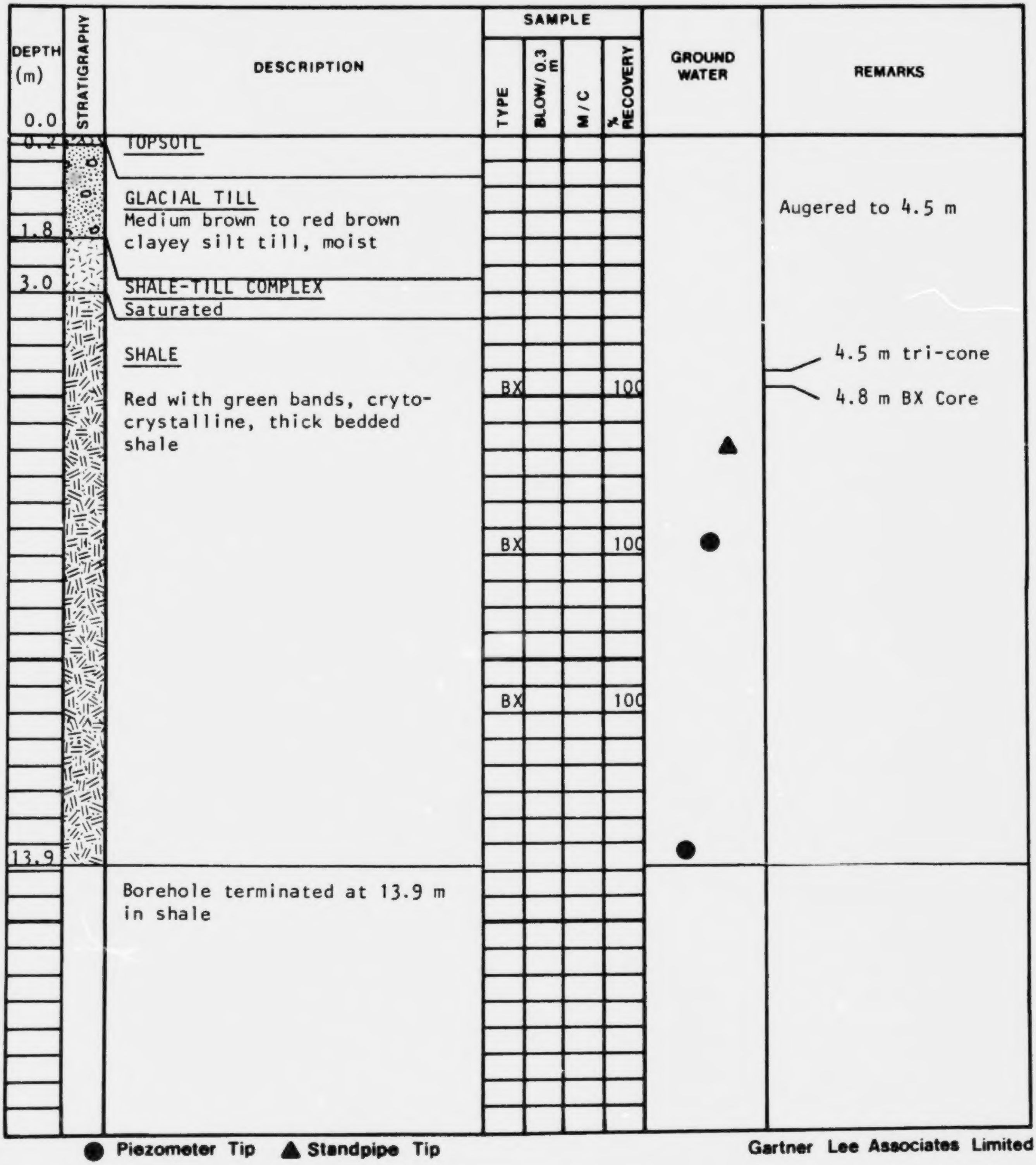
DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/0.3 m	M/C	% RECOVERY		
0.0								
0.4		TOPSOIL						
2.4		GLACIAL TILL Medium brown silt till, with minor fine sand seams, compact, saturated, moist						Augered to 6.0 m
8.4		SHALE Red Queenston Shale					▲ ●	6.0 m tri-cone
		Borehole terminated at 8.4 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 10

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE MARCH 12, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 160.0 m
TECHNOLOGIST L.L.



DEPTH (m)	DESCRIPTION	SAMPLE TYPE	BLOW/0.3 m	M/C	% RECOVERY	GROUND WATER	REMARKS
0.0							
0.2	TOPSOIL						
	GLACIAL TILL Medium brown to red brown clayey silt till, moist						Augered to 4.5 m
1.8							
3.0	SHALE-TILL COMPLEX Saturated						
	SHALE Red with green bands, cryto-crystalline, thick bedded shale						4.5 m tri-cone 4.8 m BX Core
		BX			100		
						▲	
		BX			100	●	
		BX			100		
						●	
13.9	Borehole terminated at 13.9 m in shale						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 11

PROJECT NAME OAKVILLE LANDFILL SITE
CLIENT M. M. DILLON LIMITED
BOREHOLE TYPE CME 75, 0.1 m Hollow Stem Augers
ELEVATION 172.1 m

PROJECT NO. 78-93
DATE MARCH 7, 1979
GEOLOGIST D.E.J.
TECHNOLOGIST L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
0.0		EARTH FILL						
0.5		REFUSE Mixed paper, wood, metal, plastic and concrete, dry.						
8.5		GLACIAL TILL Medium brown to red brown, silt till, very dense, saturated	SS	87/ .1m	9			
10.3		SHALE-TILL COMPLEX Mixed red shale and silt till saturated.						Sample #1 9.9-10.1 m 11% gravel 16% sand 56% silt 17% clay
11.6		SHALE Red Queenston shale					▲	
16.8		Borehole terminated at 16.8 m in shale					●	Augered to 16.8 m

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 12

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE MARCH 7, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 172.1 m
TECHNOLOGIST L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0.0		EARTH FILL						
0.3		REFUSE Mixed paper, wood, plastic, metal, fabric and concrete, dry saturated from 7.5 m						
10.7		SHALE-TILL COMPLEX Mixed red shale and silt till saturated						Leachate, odour
11.9		SHALE Red Queenston Shale					▲ ●	Augered to 16.8 m
16.8		Borehole terminated at 16.8 m in shale						

● Piezometer Tip ▲ Standpipe Tip

BOREHOLE NO. 13

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE FEB. 27, 1979
BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers
GEOLOGIST D.E.J.
ELEVATION 175.4 m
TECHNOLOGIST L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/ 0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0.0								
0.4		EARTH FILL						
		REFUSE Mixed paper, wood, plastic metal, fabric and concrete, dry						
		Saturated from 10 m						
								Augered to 16.4 m
12.5								
		GLACIAL TILL Red brown silt till saturated					▲	Sample #1 13.6-13.9 m 3% gravel 25% sand 56% silt 16% clay
14.0			SS	75/ .1m	7			
		GRAVELLY SAND Coarse gravelly sand, saturated						
14.8		GLACIAL TILL Red brown silt till saturated	SS	100/ .1m	8			
15.9		SHALE						16.4 m BX Core
		Red with greeen bands, cryptocrystalline medium bedded shale-fractured throughout	BX			85	●	
			BX			60		

● Piezometer Tip ▲ Standpipe Tip

BOREHOLE NO. 13 (continued)

PROJECT NAME OAKVILLE LANDFILL SITE **PROJECT NO.** 78-93

CLIENT M. M. DILLON LIMITED **DATE** FEB. 27, 1979

BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers **GEOLOGIST** D.E.J.

ELEVATION 175.4 m **TECHNOLOGIST** L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
19.0	▨	SHALE (continued)						
22.0		Borehole terminated at 22.0 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 14

PROJECT NAME OAKVILLE LANDFILL SITE

PROJECT NO. 78-93

CLIENT M. M. DILLON LIMITED

DATE MARCH 6, 1979

BOREHOLE TYPE CME 75, 0.1 m I.D. Hollow Stem Augers

GEOLOGIST D.E.J.

ELEVATION 171.3 m

TECHNOLOGIST L.L.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/ 0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0.0		EARTH FILL						
0.6		REFUSE Mixed wood, paper, plastic, metal, fabric and concrete, dry. — Saturated from 6.0 m						Augered to 11.8 m
9.5		GLACIAL TILL Medium brown silt till, saturated					▲	
11.0		SHALE Red with green bands, cryptocrystalline, medium bedded shale	BX			100	●	— 11.8 m BX Core
14.9		Borehole terminated at 14.9 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 15

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE JULY 16, 1979
BOREHOLE TYPE CME 55, 0.1 m, O.D. Solid Stem Augers
GEOLOGIST D.E.J.
ELEVATION 165.4 m
TECHNOLOGIST P.P.

DEPTH (m) 0.0	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/ 0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
		GLACIAL TILL Red brown silt till. Mottled colour, saturated, very pebbly.	SS	42				
			SS	38				
			SS	132				
3.5			SS	>123				
		SHALE Red Queenston Shale. Hard layers or red and green - grey limey shale occur throughout.					▲ ●	Piezometer in adjacent probe hole
							●	Piezometer in adjacent probe hole. Borehole yielded between 5 and 10 litres per min. from 9 to 10 m.
								Augered to 15 m
								Drilled 15 m to 30.5 m using 0.05 m dia. bi-cone bit.
19.0		continued-						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 15

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE JULY 16, 1979
BOREHOLE TYPE CME 55, 0.1 m O.D. Solid Stem Augers
GEOLOGIST D.E.J.
ELEVATION 165.4 m
TECHNOLOGIST P.P.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
19.0	▨	RED QUEENSTON SHALE					●	Hole cased to 24.4 m with BW casing
30.5	▨						●	
		Borehole terminated at 30.5 m in shale						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 16

PROJECT NAME OAKVILLE LANDFILL SITE
PROJECT NO. 78-93
CLIENT M. M. DILLON LIMITED
DATE JULY 18, 1979
BOREHOLE TYPE CME 55, 0.1 m, O.D. Solid Stem Augers
GEOLOGIST D.E.J.
ELEVATION 165.8 m
TECHNOLOGIST P.P.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
0.0		**GLACIAL TILL** Red brown silt till						
3.8		**SHALE** Red Queenston Shale. Hard layers or red and green - grey limey shale occur throughout.					▲	
								Augered to 11.3 m
							●	Drilled 11.3 m to 31 m using 0.05 m dia. bi-cone bit. Hole cased to 24.4 m with BW casing
19.0		Continued-						

● Piezometer Tip ▲ Standpipe Tip

BOREHOLE NO. 16

PROJECT NAME OAKVILLE LANDFILL SITE

PROJECT NO. 78-93

CLIENT M. M. DILLON LIMITED

DATE JULY 18, 1979

BOREHOLE TYPE CME 55, 0.1 m, O.D. Solid Stem Augers

GEOLOGIST D.E.J.

ELEVATION 165.8 m

TECHNOLOGIST P.P.

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
19.0	▨	RED QUEENSTON SHALE						
	▨						●	
31.5	▨						●	
		Borehole terminated at 31.5 m in shale.						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 17

PROJECT NAME OAKVILLE LANDFILL
PROJECT NO. 80-96-0
CLIENT REGIONAL MUNICIPALITY OF HALTON
DATE Oct. 7/80
BOREHOLE TYPE CME 75, 0.11 m I.D. Augers
GEOLOGIST A.B.
ELEVATION 163.7 m
TECHNOLOGIST

DEPTH m	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SAMPLE BLOW/0.3 m	SAMPLE M/C	SAMPLE % RECOVERY	GROUND WATER	REMARKS
0		TOPSOIL						
		CLAYEY SILT red brown clayey silt, A.P.L. saturated at 1.2 m						Borehole is backfilled with gravel from 4.72 m to 0.61 m Standpipe is slotted from 4.72 m to 0.61 m
1.2								
		SHALE red brown shale with green layers					▲	
							●	
9.1		Borehole terminated at 9.10 m in shale						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 18

PROJECT NAME OAKVILLE LANDFILL
PROJECT NO. 80-96-0
CLIENT REGIONAL MUNICIPALITY OF HALTON
DATE Oct. 7/80
BOREHOLE TYPE CME 75, 0.11 m I.D. Augers
GEOLOGIST A.B.
ELEVATION 166.3 m
TECHNOLOGIST

DEPTH m	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
0.0		**CLAYEY SILT** red brown clayey silt, D.T.P.L.						Borehole is backfilled with gravel from 4.72 m to 0.61 m Standpipe is slotted from 4.72 m to 0.61 m
1.2		**SHALE** red brown shale with green layers					▲ ●	
9.0		Borehole terminated at 9.00 m in shale						

● Piezometer Tip ▲ Standpipe Tip

Gartner Lee Associates Limited

BOREHOLE NO. 19

PROJECT NAME OAKVILLE LANDFILL
PROJECT NO. 80-96-0
CLIENT REGIONAL MUNICIPALITY OF HALTON
DATE Oct. 7/80
BOREHOLE TYPE CME 75, 0.11 m I.D. Augers
GEOLOGIST A.B.
ELEVATION 170.0 m
TECHNOLOGIST

DEPTH m	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
0.0		FILL red brown clayey silt fill, odd stone, D.T.P.L.						Borehole is backfilled with gravel from 5.09 m to 0.61 m Standpipe is slotted from 4.72 m to 0.61 m
1.5		SHALE red brown shale with green layers					▲	
9.0		Borehole terminated at 9.00 m in shale					●	

● Piezometer Tip ▲ Standpipe Tip

BOREHOLE NO. 20

PROJECT NAME OAKVILLE LANDFILL
PROJECT NO. 80-96-0
CLIENT REGIONAL MUNICIPALITY OF HALTON
DATE Oct. 7/80
BOREHOLE TYPE CME 75, 0.11 m I.D. Augers
GEOLOGIST A.B.
ELEVATION 170.5 m
TECHNOLOGIST

DEPTH m 0	STRATIGRAPHY	DESCRIPTION	SAMPLE				GROUND WATER	REMARKS
			TYPE	BLOW/ 0.3 m	M/C	% RECOVERY		
2.1		FILL red brown clayey silt fill, stones, D.T.P.L.						Borehole is backfilled with gravel from 5.30 m to 0.61 m Standpipe is slotted from 5.30 m to 0.61 m
8.8		SHALE red brown shale with green layers					▲ ●	
		Borehole terminated at 8.80 m in shale						

● Piezometer Tip ▲ Standpipe Tip

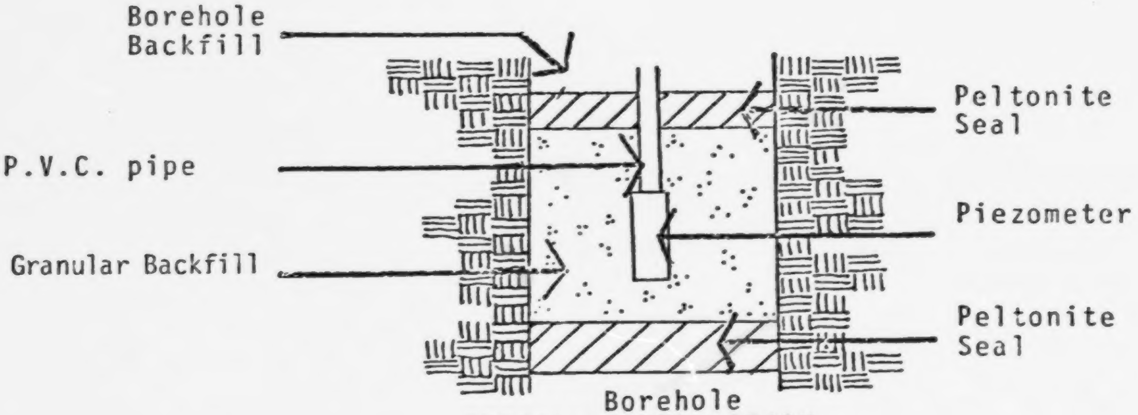
Gartner Lee Associates Limited

GROUND WATER MONITOR DETAILS

GROUND WATER MONITOR DETAILS

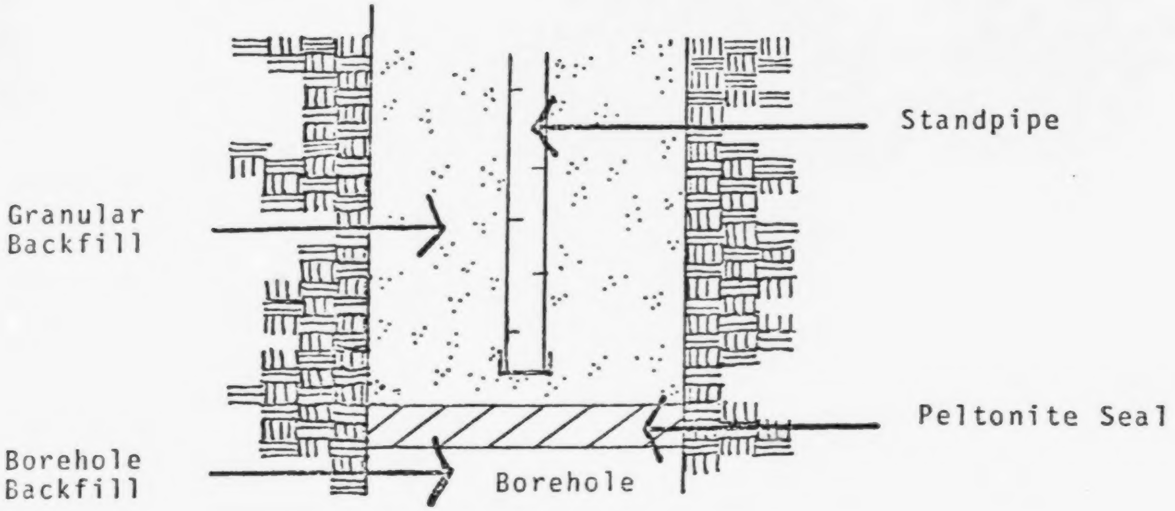
INSTALLATION DETAILS

A. PIEZOMETER: The piezometers consist of PVC pipe slotted and wrapped with fiberglass cloth over .5 m. Piezometers are used to measure the hydrostatic pressure, to obtain ground water samples and to measure in situ permeability.



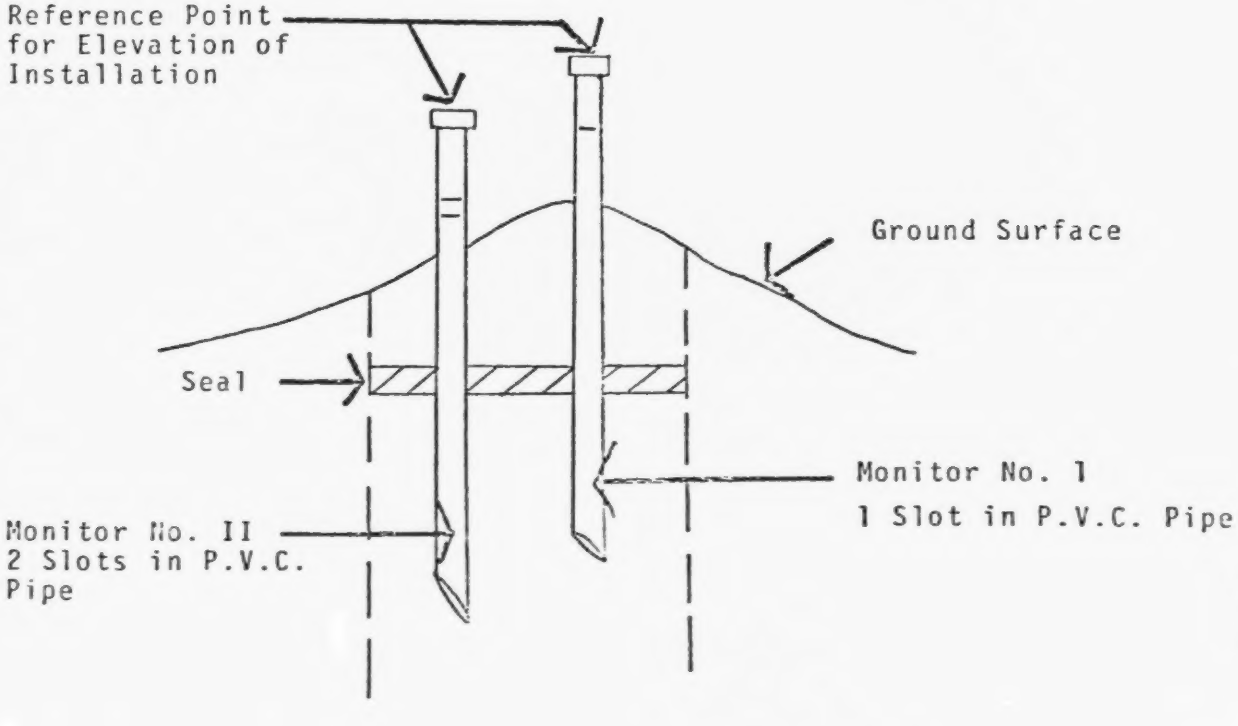
TYPICAL INSTALLATION

B. STANDPIPE: Standpipes consist of P.V.C. pipe with the bottom 2.4 m of each standpipe slotted every .3 m. Standpipes are used to measure the ground water table and to obtain ground water samples. Standpipes in B.H. 17, 18, 19 and 20 are slotted from the bottom to 0.61 m below the surface.



TYPICAL INSTALLATION

SURFACE DETAILS



PROJECT 78-93 TABLE 3 SHEET 1

GROUND WATER MONITOR DETAILS

BOREHOLE NO	MONITOR				LOCATION OF TIP		LOCATION OF SEAL	
	No	Diameter (mm)	Type	Elev (m)	Depth (m)	Elev (m)	Depth (m)	Elev (m)
1	I	31	●	171.24	9.04	162.20	4.64	166.60
	II	31	▲	171.84	5.24	166.60	1.84	170.0
2	I	31	●	170.25	12.40	157.85	11.85	158.4
	II	19	●	169.97	7.47	162.50	6.37	163.6
	III	19	▲	170.04	4.94	165.10	1.24	168.8
3	I	31	●	167.43	10.63	156.80	9.53	157.9
	II	31	▲	167.34	8.24	159.1	1.84	165.5
4	I	31	●	165.67	13.17	152.50	12.57	153.1
	II	19	●	165.73	6.83	158.90	6.23	159.5
	III	19	▲	165.76	5.96	159.8	1.36	164.4
5	I	31	●	165.42	14.12	151.30	12.72	152.7
	II	31	●	165.27	7.97	157.30	6.47	158.8
	III	31	▲	165.33	6.53	158.80	2.23	163.1
6	I	31	●	168.38	13.98	154.40	13.08	155.3
	II	31	●	168.26	11.16	157.10	9.86	158.4
	III	31	▲	168.32	8.42	159.90	1.42	166.9
7	I	31	●	169.06	9.56	159.50	8.36	160.7
	II	19	▲	169.21	5.01	164.20	1.21	168.0
8	I	31	●	164.91	9.01	155.90	6.71	158.2
	II	31	▲	164.85	6.15	158.70	2.05	162.8
9	I	31	●	164.95	11.05	153.90	10.15	154.8
	II	31	●	163.82	6.62	157.20	6.02	157.8
	III	31	▲	163.94	6.24	157.70	1.24	162.7

● - Piezometer ▲ - Standpipe

PROJECT 78-93 TABLE 3 SHEET 2

GROUND WATER MONITOR DETAILS

BOREHOLE NO	MONITOR				LOCATION OF TIP		LOCATION OF SEAL	
	No	Diameter (mm)	Type	Elev (m)	Depth (m)	Elev (m)	Depth (m)	Elev. (m)
10	I	31	●	160.34	14.04	146.3	6.44	153.9
	II	31	●	160.39	8.59	151.80	6.59	153.8
	III	31	▲	160.45	6.65	153.80	1.15	159.3
11	I	31	●	172.59	16.99	155.6	15.69	156.9
	II	31	▲	172.40	12.0	160.4	0.9	171.5
12	I	31	●	173.14	16.94	156.20	15.94	157.2
	II	31	▲	172.80	12.90	159.90	14.1 1.3	158.7 171.5
13	I	31	●	175.89	17.79	158.10	18.79	157.1
	II	31	▲	175.89	14.09	161.70	15.29 0.99	160.6 174.9
14	I	31	●	174.78	18.38	156.40	15.08	159.7
	II	31	▲	174.96	14.46	160.50	14.56 4.26	160.4 170.7
15	I	31	●	165.79	30.78	135.01	13.5	151.29
	II	19	●	165.66	20.41	145.25	5.1	160.56
	III	31	●	165.82	10.65	155.17	8.1	157.72
	IIII	19	●	165.81	5.28	160.53	5.1	160.71
	IIIII	19	▲	165.66	4.86	160.80	0.36	165.30
16	I	31	●	166.27	31.50	134.77	10.6	155.67
	II	19	●	166.22	21.82	143.40	7.5	158.72
	III	19	●	166.22	11.16	154.06	3.9	162.32
	IIII	19	▲	166.13	4.00	162.13	0.5	165.63

Note: All measurements taken from top of pipe

● - Piezometer ▲ - Standpipe

PROJECT 80-96 **TABLE** 3 **SHEET** 3

GROUND WATER MONITOR DETAILS

BOREHOLE NO.	MONITOR				LOCATION OF TIP		LOCATION OF SEAL	
	No.	Diameter (mm)	Type	Elev.(m)	Depth (m)	Elev(m)	Depth (m)	Elev. (m)
17	I	31	●	164.41	9.30	155.11	8.08	156.33
	II	31	▲	164.37	5.49	158.88	5.64	158.73
							1.37	163.00
18	I	31	●	166.85	9.05	157.80	7.83	159.02
	II	31	▲	167.02	6.10	160.92	6.10	160.92
							1.28	165.74
19	I	31	●	170.76	9.60	161.16	8.69	162.07
	II	31	▲	170.96	6.10	164.86	6.10	164.86
							1.62	169.34
20	I	31	●	171.40	9.75	161.65	8.84	162.56
	II	31	▲	171.26	6.10	165.16	6.10	165.16
							1.40	169.86

* All measurements taken from top of pipe.

● - Piezometer ▲ - Standpipe

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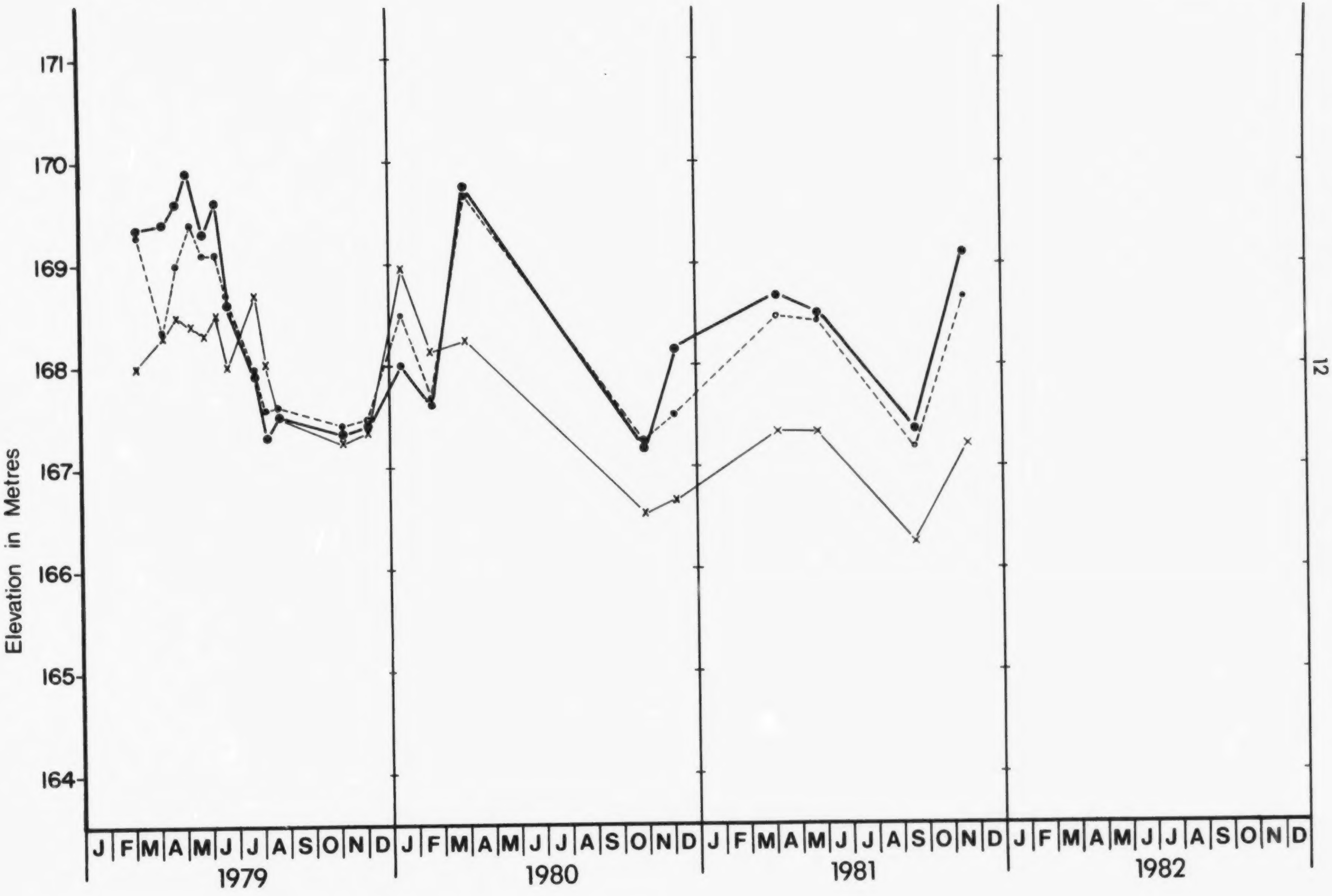
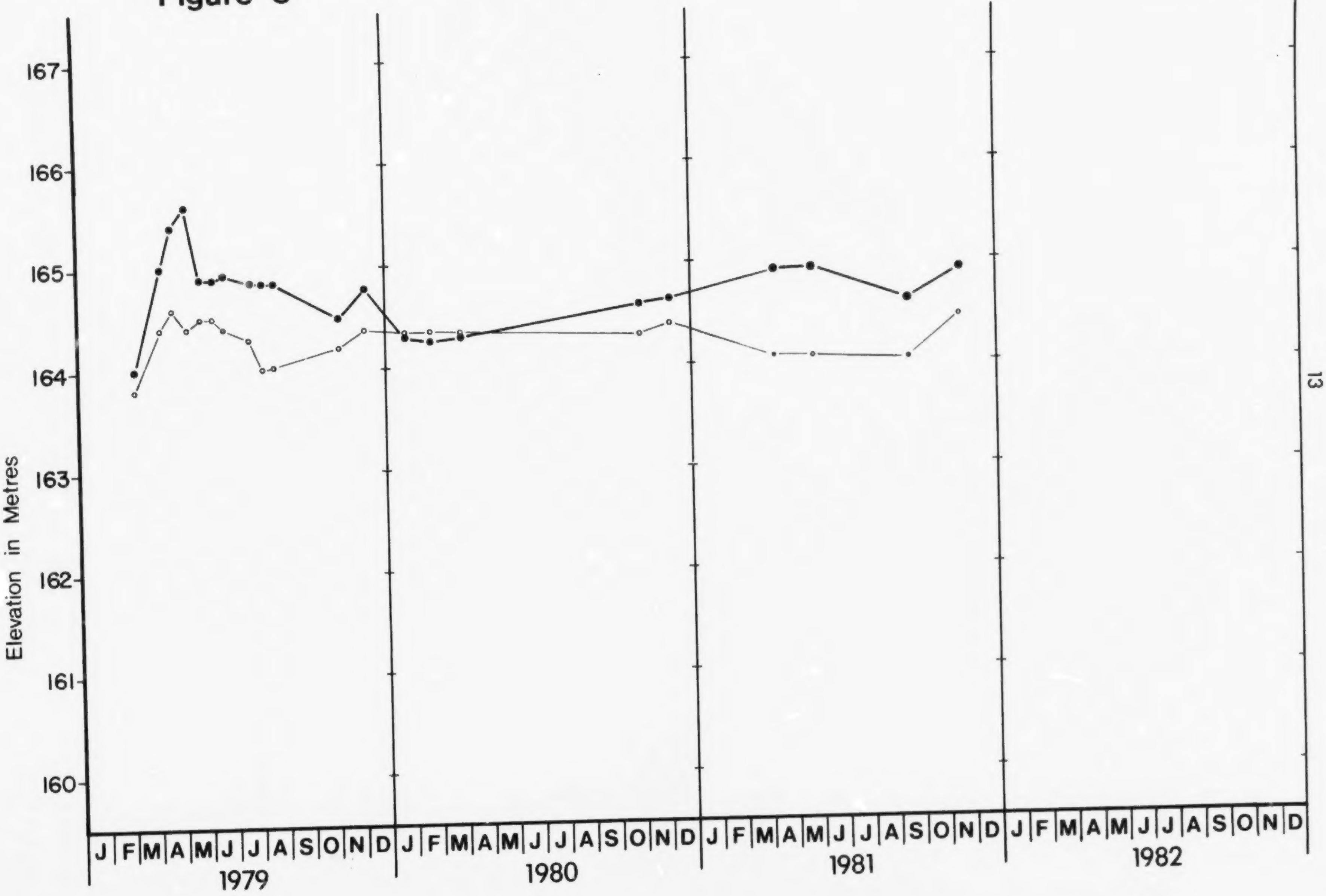
Figure 4

Project 80·96



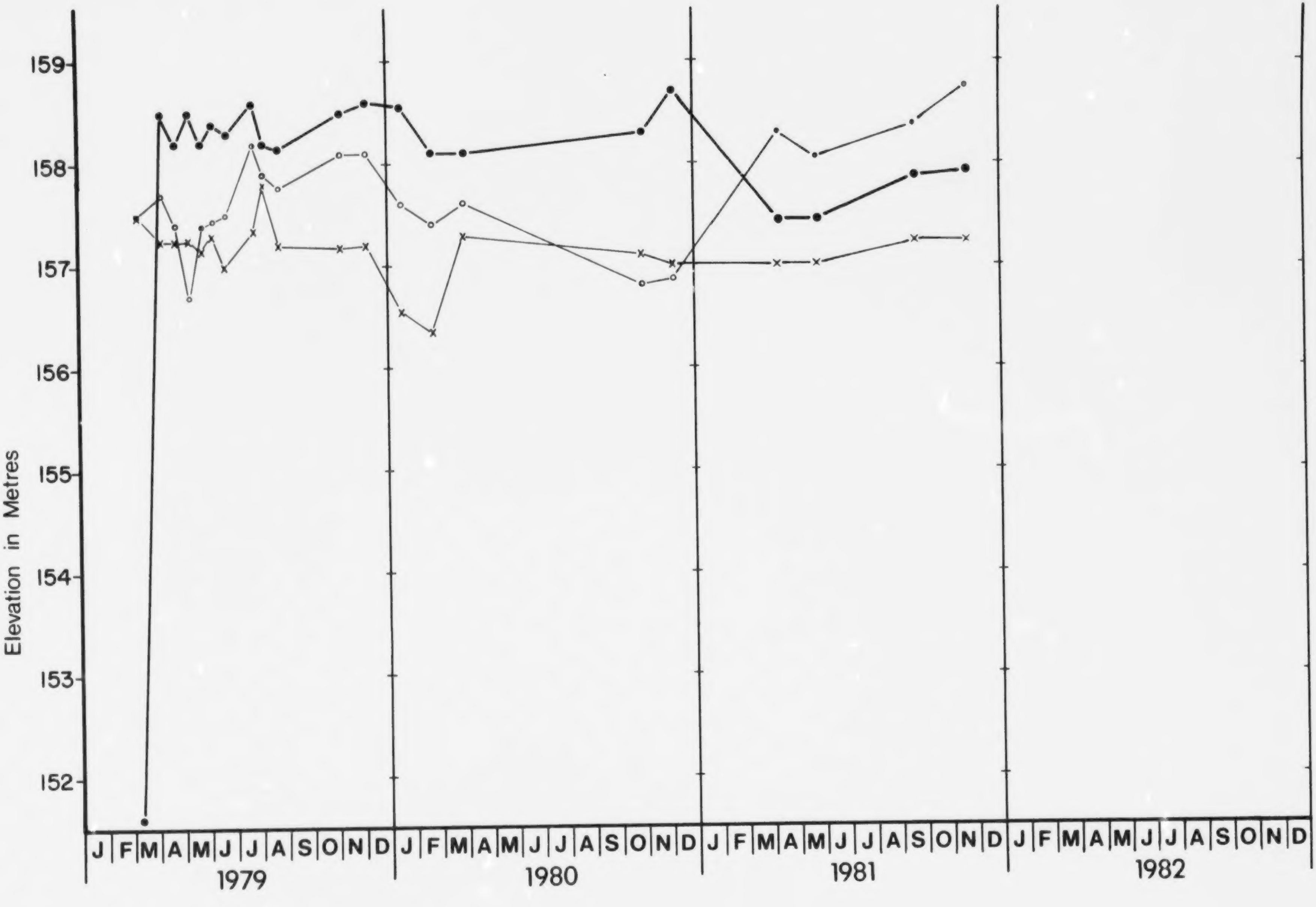
OAKVILLE LANDFILL SITE : Borehole 2 , Monitors I ×—× , II ∘----∘ , III ●—●

Figure 5



OAKVILLE LANDFILL SITE : Borehole 8 , Monitors I •—• ,II ∘—∘

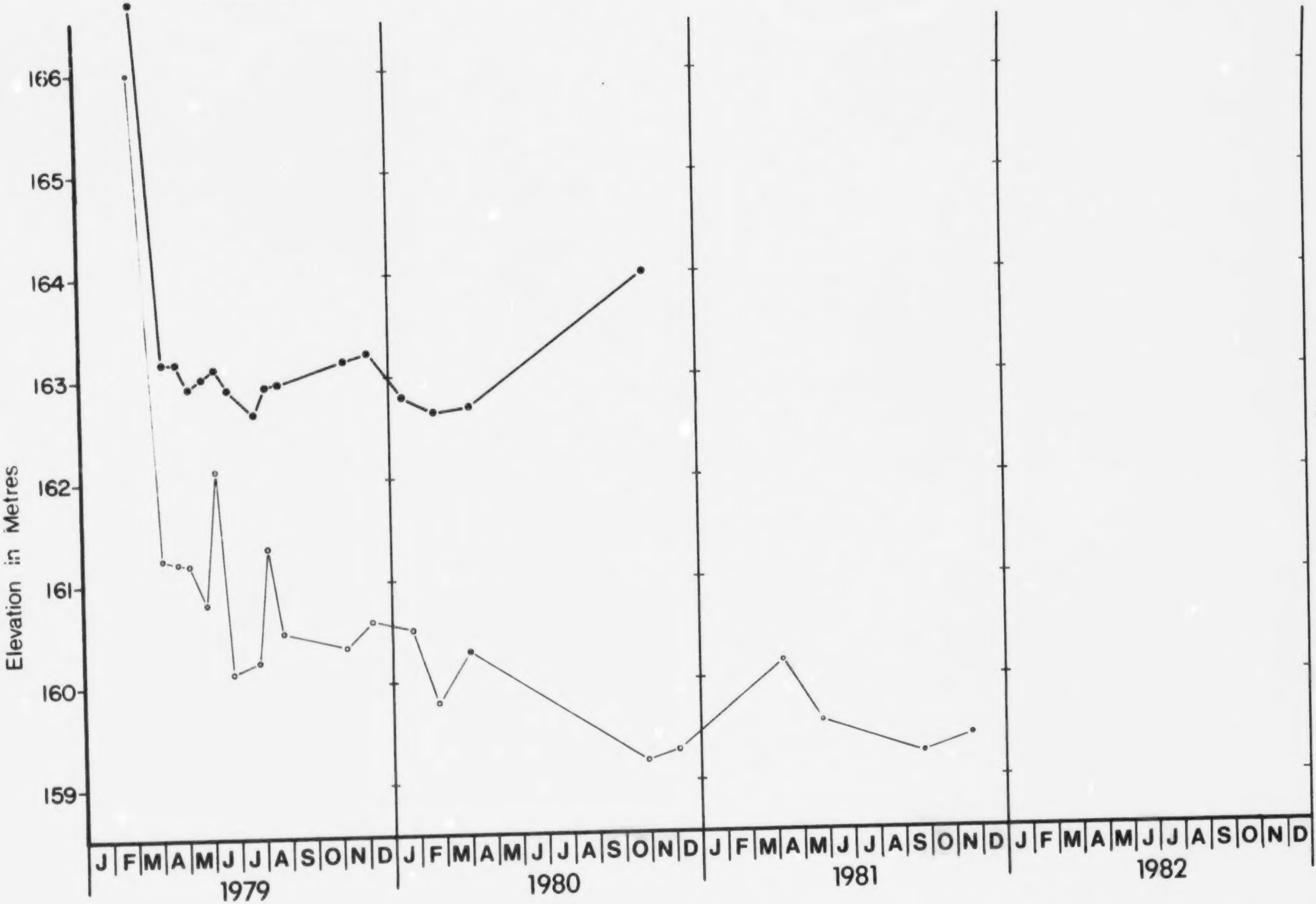
Figure 6



OAKVILLE LANDFILL SITE : Borehole 10 , Monitors I ×—× , II ●—● , III ○—○

Figure 7

Project 80·96

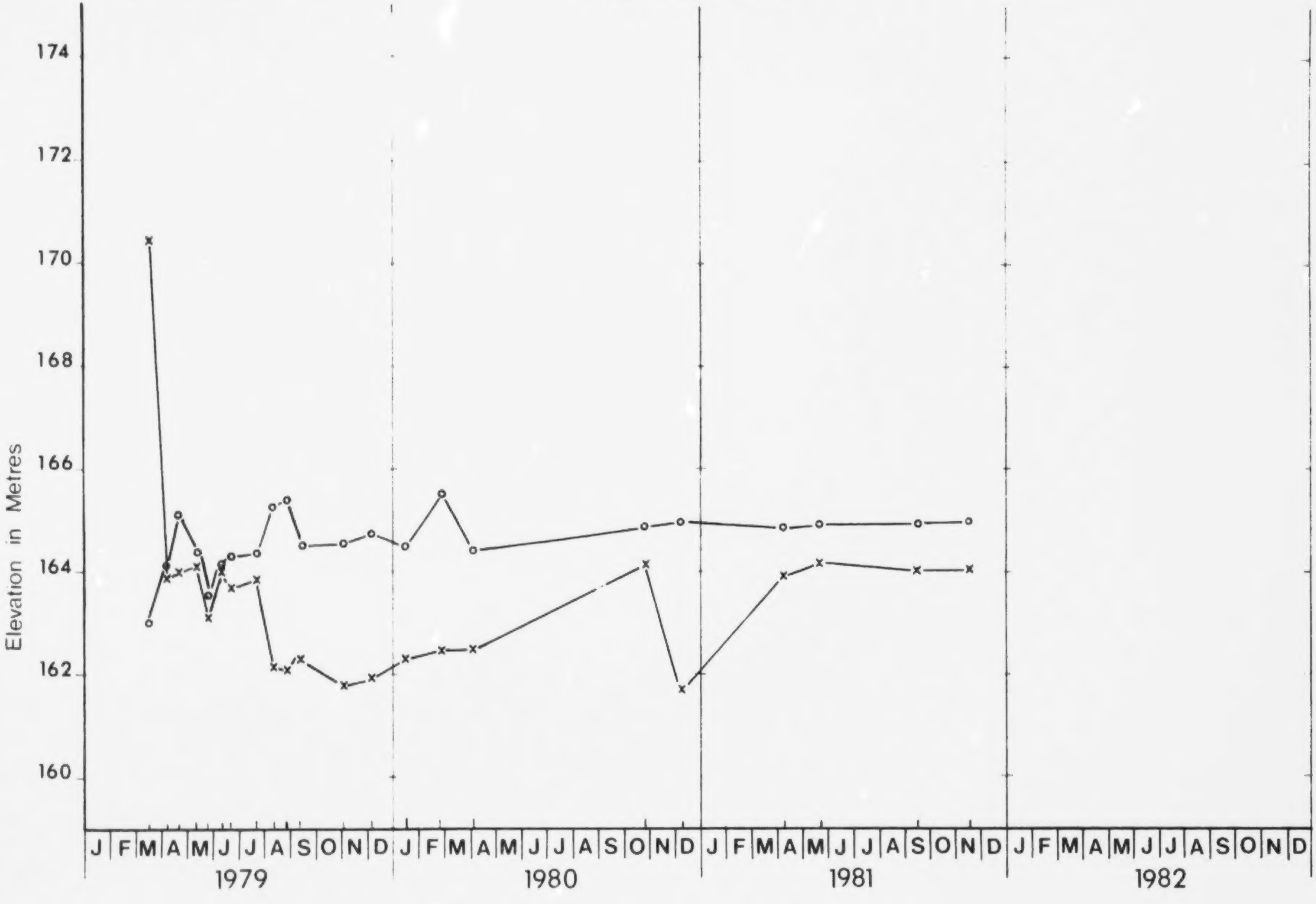


OAKVILLE LANDFILL SITE : Borehole 11 , Monitors I •—• , II ○—○

FIGURE **8**

Hydrograph

Project 80·96



OAKVILLE LANDFILL : Borehole 12 , Monitors I x——x , II o——o

GROUND WATER ELEVATIONS

PROJECT 78-93

TABLE 4 **SHEET** 1

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR		MAR. 16 1979	APR. 6 1979	APR. 20 1979	MAY 9 1979	MAY 22 1979	JUNE 11 1979	JUNE 21 1979	JULY 24 1979	AUG 14 1979	AUG 29 1979	SEPT. 11 1979
	No.	Type											
1	I	●	169.5	169.8	170.0	169.8	169.7	169.9	169.2	168.51	168.19	168.04	167.88
	II	▲	170.3	170.3	170.5	170.0	169.8	170.0	169.3	168.74	168.43	168.10	167.83
2	I	●	168.0	168.3	168.5	168.4	168.3	168.5	168.0	167.72	168.05	167.48	167.29
	II	●	169.3	168.4	169.0	169.4	169.1	169.1	168.7	167.99	167.57	167.65	167.45
	III	▲	169.4	169.4	169.6	169.4	169.3	169.6	168.6	167.94	167.32	167.50	167.31
3	I	●	160.6	161.4	161.4	165.0	164.7	165.0	165.2	164.50	163.01	163.45	163.93
	II	▲	164.7	165.8	165.9	165.5	165.4	165.5	162.8	164.62	164.49	164.58	164.28
4	I	●	164.6	155.4	155.0	157.4	155.1	155.3	156.2	157.43	153.80	165.55	165.41
	II	●	164.5	165.3	165.3	165.1	165.1	165.2	164.8	164.40	164.19	164.05	163.75
	III	▲	164.6	165.3	165.0	165.1	164.9	165.1	164.9	164.37	164.18	164.06	163.76
5	I	●	164.7	164.7	164.2	164.1	159.5	159.6	162.6	163.33	163.32	163.22	163.32
	II	●	163.7	163.7	164.1	163.8	163.4	163.3	163.3	163.18	163.27	163.20	163.17
	III	▲	164.6	164.6	164.3	164.2	164.1	164.1	164.1	164.23	164.31	164.24	164.26
6	I	●	165.4	162.4	162.8	163.2	162.1	162.3	161.9	162.71	160.90	160.59	161.48
	II	●	165.3	165.3	165.0	165.3	165.2	165.1	165.1	164.96	164.92	164.96	164.86
	III	▲	165.3	165.5	165.3	165.4	165.5	165.6	165.4	165.41	165.67	165.42	165.50

● - Piezometer ▲ - Standpipe

PROJECT 80-96 **TABLE** 4 **SHEET** 2

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR		MAR. 16 1979	APR. 6 1979	APR. 20 1979	MAY 9 1979	MAY 22 1979	JUNE 11 1979	JUNE 21 1979	JULY 24 1979	AUG. 14 1979	AUG. 29 1979	SEPT. 11 1979
	No.	Type											
7	I	●	168.3	167.9	168.0	167.9	167.8	168.3	167.7	167.34	167.25	167.16	167.06
	II	▲	168.0	168.5	168.3	168.3	168.2	168.4	168.3	167.92	167.84	167.81	167.51
8	I	●	164.0	165.0	165.4	165.6	164.9	164.8	164.9	164.91	164.81	164.81	164.75
	II	▲	163.7	164.4	164.6	164.4	164.5	164.5	164.4	164.27	164.08	164.08	163.81
9	I	●	162.1	158.4	158.3	159.8	162.5	162.7	162.4	163.03	161.74	161.65	162.92
	II	●	161.8	163.7	163.4	163.1	163.0	163.3	163.2	163.05	163.01	163.82	162.88
	III	▲	161.8	163.0	163.1	163.1	163.0	163.1	163.0	162.87	163.58	164.54	163.04
10	I	●	157.5	157.2	157.2	157.2	157.1	157.3	157.0	157.35	157.09	157.12	157.03
	II	●	151.7	158.5	158.2	158.5	158.2	158.4	158.2	158.71	158.19	158.17	158.31
	III	▲	157.5	157.8	157.4	156.6	157.4	157.4	157.5	158.32	157.80	157.81	157.76
11	I	●	166.0	161.3	161.1	161.1	160.7	162.1	160.3	160.28	161.49	160.51	160.29
	II	▲	166.6	163.1	163.1	162.9	163.0	163.1	162.9	162.76	162.83	162.90	162.75
12	I	●	170.5	163.9	164.0	164.1	163.1	164.0	163.7	163.85	162.14	162.08	162.33
	II	▲	163.0	164.1	165.1	164.4	163.5	164.1	164.3	164.36	165.25	165.40	164.53
13	I	●	164.9	165.2	164.9	165.4	165.9	166.1	165.4	165.32	165.34	165.24	165.22
	II	▲	165.0	165.2	165.0	165.5	166.4	166.4	165.5	165.40	165.64	165.84	165.29

● - Piezometer ▲ - Standpipe

Gartner Lee Associates Limited

PROJECT 80-96

TABLE 4 **SHEET** 3

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR		MAR. 16 1979	APR. 6 1979	APR. 20 1979	MAY 9 1979	MAY 22 1979	JUNE 11 1979	JUNE 21 1979	JULY 24 1979	AUG. 14 1979	AUG. 29 1979	SEPT. 11 1979
	No.	Type											
14	I	●	165.1	164.8	164.4	164.9	164.9	165.2	164.6	-	164.66	164.74	164.71
	II	▲	164.4	165.7	165.5	165.7	166.0	166.3	166.2	-	166.76	166.81	166.44
15	I	●								163.59	163.51	163.55	163.43
	II	●								163.86	163.96	163.72	163.58
	III	●								164.34	164.12	164.12	163.68
	IIII	●								164.40	164.21	164.14	163.79
	IIIII	▲								164.42	164.24	164.24	164.00
16	I	●								164.02	163.69	163.64	163.61
	II	●								163.96	163.78	163.78	163.64
	III	●								164.34	163.95	164.07	163.85
	IIII	▲								164.44	164.23	164.10	163.81

● - Piezometer ▲ - Standpipe

PROJECT 80-96 **TABLE** 4 **SHEET** 4

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Nov.2 1979	Dec. 4 1979	Jan.18 1980	Feb.26 1980	Arpil 2 1980	Oct.29 1980	Dec.9 1980	Apr.9 1981	May 25, 1981	Sep.18, 1981	Nov.19, 1981
1	I	●	167.62	168.29	169.54	168.89	169.79	166.92	168.04	169.15	169.20	168.09	169.39
	II	▲	167.64	168.38	169.64	169.08	170.13	168.20	168.04	169.04	169.09	168.01	169.33
2	I	●	167.25	167.35	168.96	168.24	168.25	166.55	166.67	167.33	167.31	166.26	167.21
	II	●	167.42	167.44	168.50	167.65	169.65	167.21	167.51	168.47	168.41	167.18	168.67
	III	▲	167.32	167.43	168.01	167.64	169.69	167.19	168.42	168.63	168.48	167.35	169.09
3	I	●	163.83	163.89	165.13	164.99	165.20	164.43	163.99	164.98	164.74	164.56	165.01
	II	▲	164.51	164.54	165.24	165.00	165.54	164.59	164.88	164.98	164.82	164.56	165.29
4	I	●	160.67	160.70	161.85	165.47	165.30	164.73	160.84	160.04	159.51	161.36	162.25
	II	●	163.60	163.61	163.77	165.63	165.32	164.46	165.20	164.88	164.75	164.71	--
	III	▲	163.79	164.11	164.33	165.64	165.11	164.41	165.16	164.89	164.73	164.69	--
5	I	●	163.23	163.44	163.88	163.55	163.57	163.54	164.79	163.88	163.82	163.80	164.80
	II	●	163.20	163.31	163.75	163.31	163.65	163.32	164.75	163.76	163.90	163.84	163.94
	III	▲	164.08	164.25	164.33	163.83	164.17	163.89	164.92	164.36	164.46	164.33	164.47
6	I	●	162.48	161.47	161.63	161.23	161.10	Destroyed					
	II	●	165.24	165.19	165.14	165.86	165.36	"					
	III	▲	165.52	165.67	166.12	166.22	165.77	"					
7	I	●	167.01	167.28	165.26	167.57	168.21	Destroyed					
	II	▲	167.53	168.12	167.91	168.78	168.90	"					
8	I	●	164.56	164.71	164.29	164.29	164.30	164.61	164.65	(Flowing) 164.90	(Flowing) 164.91	164.60	(Flowing) 164.90
	II	▲	164.20	164.37	164.31	164.35	164.29	164.29	164.42	164.05	164.05	164.01	164.45
9	I	●	162.97	163.00	163.31	163.15	163.00	163.22	Destroyed				
	II	●	162.85	162.96	163.18	163.30	163.15	163.05	"				
	III	▲	163.03	163.09	163.20	163.26	163.20	163.40	"				

● - Piezometer ▲ - Standpipe

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PROJECT 80-96

TABLE 4 **SHEET** 5

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR		Nov. 2 1979	Dec. 4 1979	Jan.18 1980	Feb.26 1980	April 2 1980	Oct.29 1980	Dec.9 1980	Apr.9, 1981	May 25, 1981	Sept.18, 1981	Nov.19, 1981
	No.	Type											
10	I	●	157.10	157.21	156.58	156.93	157.44	157.12	157.00	157.00	157.02	157.24	157.25
	II	●	158.57	158.59	158.55	158.08	158.09	158.33	158.70	158.29	158.03	158.39	158.75
	III	▲	158.03	158.13	157.60	157.49	157.54	157.85	157.91	157.44	157.40	157.88	158.02
11	I	●	160.35	160.67	160.49	159.99	160.37	159.20	159.29	160.17	159.56	159.22	159.39
	II	▲	163.16	163.26	162.80	162.69	162.68	164.00	-	-	-	-	-
12	I	●	161.79	161.93	162.32	162.43	162.49	164.16	161.71	163.92	164.18	164.01	164.06
	II	▲	164.56	164.75	164.50	165.47	164.40	164.82	164.94	164.81	164.91	164.91	165.00
13	I	●	165.19	165.12	165.47	165.42	165.57	-	-	-	-	-	-
	II	▲	165.27	165.28	165.59	165.27	165.34	-	-	-	-	-	-
14	I	●	163.58	164.81	165.85	164.87	164.44	-	-	-	165.87	165.72	171.9
	II	▲	166.55	166.53	166.64	166.56	166.76	-	-	-	167.58	166.34	169.52
15	I	●	163.51	163.48	163.64	163.78	165.19	163.87	163.81	163.86	163.59	163.79	163.84
	II	●	163.49	163.38	163.86	163.85	165.14	163.61	-	163.79	163.85	163.97	164.11
	III	●	163.75	164.65	165.07	164.61	Blocked	164.43	165.02	164.75	164.57	164.66	165.34
	IIII	●	163.75	164.79	165.16	164.61	164.21	164.48	165.23	164.87	164.71	164.71	165.34
	IIIII	▲	163.76	164.82	165.16	165.36	165.33	164.41	-	164.85	164.68	164.62	165.36
16	I	●	163.53	163.63	164.22	163.89	165.46	-	-	164.07	163.85	163.80	164.45
	II	●	163.46	164.42	164.17	163.84	164.19	163.66	-	163.88	163.92	164.00	164.42
	III	●	163.67	163.62	165.07	164.31	165.52	164.22	165.69	164.57	164.39	164.45	165.11
	IIII	▲	163.71	164.70	165.08	164.39	164.81	164.46	165.49	164.98	164.69	164.50	165.50
17	I	●						(flowing) 164.41	164.25	164.31	164.14	164.24	164.37
	II	▲						163.79	163.89	163.91	163.86	163.89	163.97
18	I	●						163.84	164.66	164.35	164.18	164.36	164.45
	II	▲						164.37	164.64	164.97	164.52	164.29	164.74

● = Piezometer ▲ = Standpipe

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PROJECT 80-96

TABLE 4 **SHEET** 6

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR		Nov. 2 1979	Dec. 4 1979	Jan.18 1980	Feb.26 1980	April 2 1980	Oct.29 1980	Dec.9 1980	Apr.9 1981	May 25 1981	Sept.18 1981	Nov.19 1981
	No.	Type											
19	I	●						166.56	166.67	167.10	167.13	166.39	167.23
	II	▲						166.67	166.81	167.62	167.77	166.59	167.43
20	I	●						166.80	166.93	167.54	167.58	166.55	167.45
	II	▲						167.37	167.64	168.57	168.64	166.39	168.5

● - Piezometer ▲ - Standpipe

SURFACE WATER FLOW ESTIMATES

PROJECT 80-96 OAKVILLE LANDFILL SITE **TABLE** 5 **SHEET** 1

SURFACE WATER FLOW ESTIMATES (L/min)

STATION	May 9 1979	June 11 1979	June 24 1979	Aug.14 1979	Sept.12 1979	Oct. 1980	Dec. 1980	Feb.25 1981	Apr.9 1981	May 21 1981	Sept.18 1981	Nov.19 1981
SW1	438	120	NF	NF	NF	NF	NF	600	1	10	NF	600
SW2	590	270	4	NF	NF	NF	NF	1100	300	20	5	1200
SW3	104	60	4.5	NF	NF	NF	NF	1200	450	20	5	1400
SW4	25	14	0.5	NF	NF	NF	NF	30	1	1	NF	80
SW5						NF	NF	2500	450	60	65	3,000
SW6						150000	100000	300000	-	-	224,000	-
SW7						150000	100000	800000	-	-	264,000	-

NF = No Flow

APPENDIX II

GROUND WATER QUALITY ANALYSIS
RESULTS

ONTARIO MINISTRY Of The ENVIRONMENT

DRINKING WATER QUALITY CRITERIA

For The SUBSTANCES ANALYZED

Substance	Concentration mg/L
Chloride (Cl)	250.0
Sulphate (SO_4)	250.0
Organic Nitrogen (Total Kjeldahl minus free ammonia)	0.15
Nitrate (N)	10.0
Iron (Fe)	0.3
Phenols	0.001

PROJECT 80-96

TABLE 6 **SHEET** 1

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 1 PIEZOMETER 1

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Feb. 1980	Mar. 1980	Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981		1979-80 Mean
CONDUCTIVITY µMHOS/CM.		1780	1779	1750	5500	2260	2100	2100	2150	1975		2467
pH							7.8	7.3		7.4		7.6
HARDNESS ($CaCO_3$)		870							895	827		
COD							32	42	39	12		37
CHLORIDES (Cl)		119					187	227	236	210		178
SULPHATES (SO_4)		490					660	540	546	570		563
PHOSPHOROUS AS P	**Total**								.15	.04		
	Soluble								.04	-		
NITROGEN (N)	**Total Kjeldahl**	1.0							.8	.4		1.0
	Free Ammonia								.1	<.1		
	Nitrite								.01	.01		
	Nitrate								1.7	1.7		
METALS	**Potassium (K)**	13.5	16.0							19.2		15
	Magnesium (Mg)									116		
	Calcium (Ca)									140		
	Sodium (Na)									177		
	Iron (Fe)	2.6	0.80	1.90	4.8	1.64			9.6	.54		2.35
Phenol (ppb)		<1	<1	<1	1	1	<1	<1	<1	-		<1
BOD		110	<5	2.5	3.0	4.0	15	21	1.8	.2		23
DOC or Alkalinity			2.0	1.9	3.4	1.6				326*		2.2

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 2

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 2 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS/CM.		12800	11550	7900	3950							12175
pH		7.0	5.8		7.5							6.9
HARDNESS (Ca CO$_3$)				1645	1024							
COD		220	240	100	45							230
CHLORIDES (Cl)		1450	3856	2060	860							2653
SULPHATES (SO$_4$)		1300	1200	1220	1025							1250
PHOSPHOROUS AS P	Total			.21	.1							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			.6	.4							
	Free Ammonia			.6	<.1							
	Nitrite			.24	.01							
	Nitrate			2.6	2.9							
METALS	Potassium (K)				50							
	Magnesium (Mg)				86							
	Calcium (Ca)				268							
	Sodium (Na)				660							
	Iron (Fe)			5.15	3.1							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		11.0	8.0	11	>5							9.5
Alkalinity					144							

NOTE: concentrations in p.p.m. unless otherwise noted.

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TABLE 6 SHEET 3

PROJECT 80-96

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 3 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS/CM.		2725	2650	3050	2700							2688
pH		7.3	7.3	-	7.5							7.3
HARDNESS (Ca CO_3)				556	513							
COD		76	83	61	45							79.5
CHLORIDES (Cl)		592	618	675	676							605
SULPHATES (SO_4)		335	380	445	440							358
PHOSPHOROUS AS P	Total			.13	.08							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			.6	.4							
	Free Ammonia			.6	<.1							
	Nitrite			.77	.01							
	Nitrate			1.5	1.8							
METALS	Potassium (K)				40							
	Magnesium (Mg)				37							
	Calcium (Ca)				144							
	Sodium (Na)				410							
	Iron (Fe)			4.00	.78							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		3.5	6.5	5.0	>6							5
Alkalinity					48							

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 4

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 4 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS/CM.		385	370	455	3450							378
pH		7.6	7.7	-	7.4							7.7
HARDNESS ($CaCO_3$)				180	690							
COD		11	49	24	60							30
CHLORIDES (Cl)		35	38	48	1072							37
SULPHATES (SO_4)		32	34	29	430							33
PHOSPHOROUS AS P	**Total**			.08	.04							
	Soluble			<.02	-							
NITROGEN (N)	**Total Kjeldahl**			.6	2.0							
	Free Ammonia			<.1	1.4							
	Nitrite			.02	.02							
	Nitrate			.8	1.1							
METALS	**Potassium (K)**				19							
	Magnesium (Mg)				51							
	Calcium (Ca)				192							
	Sodium (Na)				560							
	Iron (Fe)			2.22	.59							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		1.6	2.5	1.4	>5							2.1
Alkalinity					121							

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96

TABLE 6 SHEET 5

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 4 PIEZOMETER II

PROPERTY		Oct. 1980	Dec. 1980									1980 Mean
CONDUCTIVITY µMHOS/CM.		1025	1050									1038
pH		7.9	7.86									7.9
HARDNESS (Ca CO_3)												
COD		78	51									65
CHLORIDES (Cl)		97	118									108
SULPHATES (SO_4)		126	130									128
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)											
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)											
Phenol (ppb)		<1	<1									<1
BOD		22	23									22.5

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96

TABLE 6 **SHEET** 6

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 5 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY µMHOS/CM.		4500	4000	1120	1210							4250
pH		7.7	7.14	-	7.5							7.4
HARDNESS (Ca CO_3)				478	622							
COD		800	430	275	100							615
CHLORIDES (Cl)		740	544	143	138							642
SULPHATES (SO_4)		154	58	39	74							106
PHOSPHOROUS AS P	Total			1.2	.38							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			8.6	3.2							
	Free Ammonia			2.0	.1							
	Nitrite			.04	.08							
	Nitrate			<.1	1.6							
METALS	Potassium (K)				9							
	Magnesium (Mg)				56							
	Calcium (Ca)				156							
	Sodium (Na)				63							
	Iron (Fe)			54	19.1							
Phenol (ppb)		<1	8	<1	-							4
BOD		64	50	24	10							57
Alkalinity					474							

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 7

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 5 PIEZOMETER II

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY µMHOS CM.		6150	6700	6900	6300							6425
pH		7.3	7.05	-	7.4							
HARDNESS (Ca CO_3)				1645	1378							
COD		710	510	595	570							610
CHLORIDES (Cl)		870	1272	1150	1297							1071
SULPHATES (SO_4)		1320	780	200	290							1050
PHOSPHOROUS AS P	Total			.85	.7							
	Soluble			.06	-							
NITROGEN (N)	Total Kjeldahl			130	134							
	Free Ammonia			110	160							
	Nitrite			.05	.03							
	Nitrate			<.1	.1							
METALS	Potassium (K)				214							
	Magnesium (Mg)				238							
	Calcium (Ca)				160							
	Sodium (Na)				820							
	Iron (Fe)			21	5.6							
Phenol (ppb)		2	10	34	-							6
BOD		70	50	48	46							60
Alkalinity					1080							

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 8

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 6 PIEZOMETER I

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	April 1980						1979-80 Mean
CONDUCTIVITY µMHOS CM.		35500	39000	37000	40000	37700						37840
pH												
HARDNESS (Ca CO_3)												
COD												
CHLORIDES (Cl)												
SULPHATES (SO_4)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)	260		300								280
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	42.0	430	150	89.5	1400						422
Phenol (ppb)		10	50	40	5	1						21.2
BOD			19	240	110	28						99.3
DOC												

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 9

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 6 PIEZOMETER II

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	April 1980						1979-80 Mean
CONDUCTIVITY μMHOS CM.		29950	24500	20500	18200	15000						21630
pH												
HARDNESS (Ca CO_3)												
ALKALINITY (Ca CO_3)												
CHLORIDES (Cl)												
SULPHATES (SO_4)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)	130		100								115
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	5.0	15.6	25	13	77						27.1
Phenol (ppb)		36.4	105	25	14	2						36.5
BOD		46.0	22	22	35	20						29
DOC			180		50							115

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96

TABLE 6 **SHEET** 10

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 6 STANDPIPE III

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	Arpil 1980						1979-80 Mean
CONDUCTIVITY µMHOS / CM.		5700	5050	4800	6150	6150						5570
pH												
HARDNESS (Ca CO$_3$)												
ALKALINITY (Ca CO$_3$)												
CHLORIDES (Cl)												
SULPHATES (SO$_4$)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)	35		42								38.5
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	52	58.0	60	11.4	92						54.7
Phenol (ppb)		9	25	50	100	55						48
BOD		50	56	205	130	64						101
DOC		77	66	84	203	142						114

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 11

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 8 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM		3250	3325	4000	3550							3288
pH		7.6	7.16		7.9							7.4
HARDNESS (Ca CO_3)				1350	1321							
COD		40	54	63	30							47
CHLORIDES (Cl)		648	694	750	736							671
SULPHATES (SO_4)		740	800	1000	940							770
PHOSPHOROUS AS P	Total			.08	.02							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			4.3	1.2							
	Free Ammonia			3.0	<.1							
	Nitrite			.05	<.01							
	Nitrate			<.1	2.5							
METALS	Potassium (K)				27							
	Magnesium (Mg)				163							
	Calcium (Ca)				260							
	Sodium (Na)				400							
	Iron (Fe)			4.1	2.3							
Phenol (ppb)		10	<1	4	-							5
BOD		6.5	8	16	1.4							7.3
Alkalinity					139							

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96 **TABLE** 6 **SHEET** 12

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 9 PIEZOMETER I

PROPERTY		Oct. 1980										
CONDUCTIVITY μMHOS CM		5225										
pH		7.4										
HARDNESS (Ca CO_3)												
COD		130										
CHLORIDES (Cl)		1486										
SULPHATES (SO_4)		900										
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)											
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)											
Phenol (ppb)		1										
BOD		3.0										

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 13

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 9 PIEZOMETER II

PROPERTY		Oct. 1980										
CONDUCTIVITY μMHOS CM.		2725										
pH		7.5										
HARDNESS (Ca CO_3)												
COD		430										
CHLORIDES (Cl)		588										
SULPHATES (SO_4)		400										
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)											
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)											
Phenol (ppb)		<1										
BOD		2.0										

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96 **TABLE** 6 **SHEET** 14

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 10 PIEZOMETER I

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Feb. 1980	Mar. 1980	Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981		1979-80 Mean
CONDUCTIVITY μMHOS/CM.		19400	19450	20000	22,900	22,900	29,100	31,250	40,000	34,500		23,571
pH							6.7	6.72	-	6.8		6.7
HARDNESS ($CaCO_3$)		4600							10,200	10,170		
COD							460	700	643	320		580
CHLORIDES (Cl)		6690					11555	13200	15,500	17,010		10482
SULPHATES (SO_4)		1440					1600	1580	1625	1650		1540
PHOSPHOROUS AS P	Total								.12	.06		
	Soluble								<.02	-		
NITROGEN (N)	Total Kjeldahl	13.0							21	18		13
	Free Ammonia								11	18		
	Nitrite								.02	.03		
	Nitrate								.5	.3		
METALS	Potassium (K)	76.0	74.0							150		75
	Magnesium (Mg)									819		
	Calcium (Ca)									2720		
	Sodium (Na)									6800		
	Iron (Fe)	2.60	0.9	1.80	3.6	3.6			11.3	12.5		2.5
Phenol (ppb)		6	6	2	3	3	1	15	1	-		5
BOD		20	42	13	46	46	7.0	14	10	6.5		26.9
DOC or *Alkalinity					50	50				*87		50

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 15

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 10 PIEZOMETER II

PROPERTY		Nov. 1979	Dec. 1979	Feb. 1980	Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981				1979-80 Mean
CONDUCTIVITY µMHOS CM.		34,500	33,000	32,500	32,000	30,500	34,000	29,000				32,500
pH					7.1	7.05	-	7.1				7.1
HARDNESS (Ca CO_3)							8660	8500				
COD					820	780	488	230				800
CHLORIDES (Cl)					13670	13530	12,900	15,320				13600
SULPHATES (SO_4)					1540	1600	1700	1700				1570
PHOSPHOROUS AS P	Total						.08	.14				
	Soluble						<.02	-				
NITROGEN (N)	Total Kjeldahl						15	16				
	Free Ammonia						13	16				
	Nitrite						.02	.01				
	Nitrate						.3	.1				
METALS	Potassium (K)	100						130				100
	Magnesium (Mg)							705				
	Calcium (Ca)							2240				
	Sodium (Na)							4700				
	Iron (Fe)	2.0	2.75	1.22			8.7	1.8				2.0
Phenol (ppb)		<1	<1	<1	<1	<1	<1	-				<1
BOD		<10	1	.6	.4	8	-	.4				3.0
Alkalinity								31				

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96 **TABLE**____ **SHEET**____

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 10 STANDPIPE III

PROPERTY			Apr.19 1981	Nov.24 1981										
CONDUCTIVITY μMHOS/CM.			26,000	1925										
pH			-	7.8										
HARDNESS (Ca CO_3)			7050	704										
ALKALINITY (Ca CO_3)			-	593										
CHLORIDES (Cl)			9,900	358										
SULPHATES (SO_4)			1580	70										
PHOSPHOROUS AS P		Total	.55	.14										
		Soluble	.02	-										
NITROGEN (N)	Total Kjeldahl		10	2.4										
	Free Ammonia		10	<.1										
	Nitrite		.21	1.1										
	Nitrate		3.6	17										
METALS	Potassium (K)			48										
	Magnesium (Mg)			71										
	Calcium (Ca)			165										
	Sodium (Na)			161										
	Iron (Fe)		38	1.8										
	Phenol		<1	-										
	BOD		-	12										
	COD		520	75										

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 16

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 12 PIEZOMETER I

PROPERTY		Dec. 1980	Apr.19 1981	Nov.24 1981								
CONDUCTIVITY μMHOS CM.		2950	3300	2800								
pH		7.24	-	7.53								
HARDNESS (Ca CO_3)			850	827								
COD		980	260	120								
CHLORIDES (Cl)		570	590	528								
SULPHATES (SO_4)		10	13	11								
PHOSPHOROUS AS P	**Total**		.22	.22								
	Soluble		<.02	-								
NITROGEN (N)	**Total Kjeldahl**		7.6	5.6								
	Free Ammonia		3.6	4.9								
	Nitrite		.02	.01								
	Nitrate		.1	.1								
METALS	**Potassium (K)**			48								
	Magnesium (Mg)			109								
	Calcium (Ca)			152								
	Sodium (Na)			370								
	Iron (Fe)		18.6	11.8								
Phenol (ppb)		150	23	-								
BOD		410	92	32								
Alkalinity				982								

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 17

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 12 STANDPIPE II

PROPERTY		Dec. 1980	Apr.19 1981	Nov.24 1981								
CONDUCTIVITY µMHOS CM.		15000	15000	9300								
pH		5.95	-	6.8								
HARDNESS (Ca CO$_3$)			8150	3636								
COD		36000	33300	9500								
CHLORIDES (Cl)		1338	1230	1031								
SULPHATES (SO$_4$)		220	190	55								
PHOSPHOROUS AS P	Total		2.2	1.1								
	Soluble		.16	-								
NITROGEN (N)	Total Kjeldahl		456	310								
	Free Ammonia		340	250								
	Nitrite		.4	.08								
	Nitrate		.2	.3								
METALS	Potassium (K)			234								
	Magnesium (Mg)			490								
	Calcium (Ca)			648								
	Sodium (Na)			1020								
	Iron (Fe)		2400	670								
Phenol (ppb)		6000	6850	-								
BOD		>1600	21000	7500								
Alkalinity				3912								

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96 **TABLE** 6 **SHEET** 18

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 13 PIEZOMETER I

PROPERTY		Nov. 1979	Dec. 1979	Feb. 1980								1979-80 Mean
CONDUCTIVITY μMHOS CM		5200	1650	2040								2963
pH												
HARDNESS (Ca CO_3)												
ALKALINITY (Ca CO_3)												
CHLORIDES (Cl)												
SULPHATES (SO_4)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)	17.0										17
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	3.5	4.10	1.32								3.0
Phenol (ppb)		23	150	19								64
BOD		110	62	14								62
DOC		56	29.0	7.4								30.8

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 19

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 13 STANDPIPE II

PROPERTY		Dec. 1979	Jan. 1980	Feb. 1980								1979-80 Mean
CONDUCTIVITY µMHOS / CM.		2100	1750	1860								1903
pH												
HARDNESS (Ca CO_3)												
ALKALINITY (Ca CO_3)												
CHLORIDES (Cl)												
SULPHATES (SO_4)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)											
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	456.0	67.5	71.5								198
Phenol (ppb)		55	45	20								40
BOD		390	68	35								164
DOC		88	40	14								47

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 20

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 14 PIEZOMETER I

PROPERTY		Sept. 1979										
CONDUCTIVITY μMHOS CM.		2290										
pH												
HARDNESS (Ca CO_3)		552										
ALKALINITY (Ca CO_3)												
CHLORIDES (Cl)		396										
SULPHATES (SO_4)		245										
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl	4.0										
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)	17.0										
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	21.0										
Phenol (ppb)		1										
BOD		9.0										

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 21

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 15 PIEZOMETER I

PROPERTY		Sept.11 1979	Nov.2 1979	Dec.4 1979	Jan. 1980	Feb. 1980	Oct. 1980	Dec. 1980	Apr.19 1981	May 25 1981	Sept.22 1981	1979-80 Mean
CONDUCTIVITY µMHOS CM		37000	33500	30500	33500	30900	31800	32200	30,000	38,600	33,000	32779
pH							6.8	6.77	-	-	6.9	6.8
HARDNESS ($CaCO_3$)									5800	8150	7960	
COD							830	480	320	36	580	655
CHLORIDES (Cl)							13500	14600	11,300	14,900	14,150	14050
SULPHATES (SO_4)							660	720	593	720	800	690
PHOSPHOROUS AS P	**Total**								.24	-	1.0	
	Soluble								<.02	-	-	
NITROGEN (N)	**Total Kjeldahl**								18	16	28	
	Free Ammonia								.8	16	27	
	Nitrite								.03	<.01	.02	
	Nitrate								.6	.1	.1	
METALS	**Potassium (K)**		110		120						132.5	115
	Magnesium (Mg)										598	
	Calcium (Ca)										2200	
	Sodium (Na)										6150	
	Iron (Fe)		5.0	4.50	6.0	7.75			4.70	5.75	7.3	5.8
Phenol (ppb)		2	9	4.0	3	3	<1	<1	<1	<1	-	3.0
BOD				0.8	3.5	8.0	2.0	4.0	-	<5	32	7.3
Alkalinity											114	

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 22

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 15 PIEZOMETER II

PROPERTY		Sept.11 1979	Nov.2 1979	Dec.4 1979	Jan. 1980	Feb. 1980	April 1980	Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981	1979-80 Mean
CONDUCTIVITY μMHOS CM.		21000	23100	25000	23000	21500	18600	15250	16500	17,000	12,200	20494
pH								7.5	7.28	-	7.4	7.4
HARDNESS (Ca CO_3)										3110	1972	
COD								250	250	205	110	250
CHLORIDES (Cl)								4660	5765	5340	3240	5213
SULPHATES (SO_4)								2900	2350	2200	3150	2625
PHOSPHOROUS AS P	Total									.08	.14	
	Soluble									<.02	-	
NITROGEN (N)	Total Kjeldahl									10	3.6	
	Free Ammonia									14	.2	
	Nitrite									.02	.02	
	Nitrate									.4	-	
METALS	Potassium (K)		81		85						85	83
	Magnesium (Mg)										158	
	Calcium (Ca)										528	
	Sodium (Na)										2550	
	Iron (Fe)		5.0	2.85	5.5	2.8	2.8			4.4	6.4	3.8
Phenol (ppb)		9	26	14	7	60	<1	<1	<1	<1	-	12
BOD			7.0	4.0	4.0	5.0	1.0	9.0	3.0	-	12	4.7
DOC or *Alkalinity					57	68					45	62.5

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 23

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 15 PIEZOMETER III

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	Oct. 1980	Dec. 1980	Apr.19 1981	May 25 1981	Nov.24 1981	1979-80 Mean
CONDUCTIVITY µMHOS CM.		7600	6250	6000	6200	6800	6700	6300	6700	6230	5500	6550
pH							7.5	7.4	-	-	7.6	7.5
HARDNESS (Ca CO_3)									1650	1660	1278	
COD							87	64	84	71	25	76
CHLORIDES (Cl)							950	927	905	800	702	939
SULPHATES (SO_4)							2800	2850	2710	2100	2160	2825
PHOSPHOROUS AS P	Total								.06	-	.04	
	Soluble								<.02	-	-	
NITROGEN (N)	Total Kjeldahl								5.8	5.4	4.2	
	Free Ammonia								4.4	4.8	<.1	
	Nitrite								.02	<.01	.47	
	Nitrate								.2	<.1	.5	
METALS	Potassium (K)		44		45						38	45
	Magnesium (Mg)										106	
	Calcium (Ca)										336	
	Sodium (Na)										975	
	Iron (Fe)		4.2	0.44	4.8	1.6			1.84	-	.90	
Phenol (ppb)		15	<1	<1	<1	<1	<1	<1	<1	<1	-	2.1
BOD			4.0	4.0	1.0	3.0	10	7	4.5	4.0	1.4	4.8
DOC or *Alkalinity			12.4		11.2	4.4					*118	9.3

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96 **TABLE** 6 **SHEET** 24

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 15 PIEZOMETER IIII

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	April 1980	Dec. 1980	Apr.19 1981	Nov.24 1981		1979-80 Mean
CONDUCTIVITY μMHOS CM.		3000	1575	1090	1480	2950	925	865	1550	750		1698
pH								7.63	-	7.6		7.6
HARDNESS ($CaCO_3$)									496	373		
COD								51	41	18		51
CHLORIDES (Cl)								64	238	27		64
SULPHATES (SO_4)								860	164	58		860
PHOSPHOROUS AS P	Total								.17	.1		
	Soluble								<.02	-		
NITROGEN (N)	Total Kjeldahl								1.0	.4		
	Free Ammonia								.4	<.1		
	Nitrite								.06	.02		
	Nitrate								.1	.1		
METALS	Potassium (K)		23		11					10		17
	Magnesium (Mg)									34		
	Calcium (Ca)									93		
	Sodium (Na)									28		
	Iron (Fe)		6.0	4.85	3.0	2.6	2.8		7.4	3.95		3.9
Phenol (ppb)		<1	<1	<1	1	9	1	<1	<1			1.6
BOD			15	4.0	6.0	2.0	1.0	8	.8	5		6.0
DOC or Alkalinity			14.2	4.2	7.9	1.8	1.8			360		6.0

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 25

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 15 INSTALLATION IIIII

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	April 1980							1979-80 Mean
CONDUCTIVITY μMHOS CM.		1040	840	1400	19600							5720
pH												
HARDNESS ($CaCO_3$)												
COD												
CHLORIDES (Cl)												
SULPHATES (SO_4)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)	9.9		32								21
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)	32.0	16.2	4.6	3.4							14
Phenol (ppb)		1	55	<1	<1							14
BOD		14	4.0	31	2.0							12.8
DOC		2.7	2.6	8.0								4.4

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96

TABLE 6 **SHEET** 26

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 16 PIEZOMETER I

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Jan. 1980	Apr.19 1981	May 22 1981	Sept.25 1981				1979-80 Mean
CONDUCTIVITY µMHOS CM		2620	2710	2450	650	550	600	640				2108
pH						-	-	7.7				
HARDNESS (Ca CO_3)						203	240	230				
COD						24	25	60				
CHLORIDES (Cl)						55	60	57				
SULPHATES (SO_4)						76	76	84				
PHOSPHOROUS AS P	Total					1.0	-	.44				
	Soluble					<.02	-	-				
NITROGEN (N)	Total Kjeldahl					.6	.8	1.6				
	Free Ammonia					.4	<.1	<.1				
	Nitrite					.02	.01	.01				
	Nitrate					.6	.4	.1				
METALS	Potassium (K)		16.0					1.5				16
	Magnesium (Mg)							9				
	Calcium (Ca)							77				
	Sodium (Na)							68				
	Iron (Fe)		3.4	1.65	3.58	1.75	2.0	11.2				2.9
Phenol (ppb)		<1	<1	<1	<1	<1	2	-				<1
BOD			>16	25	7.0	1.6	7.0	2.5				16
DOC or*Alkalinity			7.0	10.4	5.0			*209				7.5

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 27

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 16 PIEZOMETER II

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Feb. 1980	Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981			1979-80 Mean
CONDUCTIVITY μMHOS CM.		3700	6850	7000	2220	940	4750	3450	3050			4243
pH						8.1	7.6	-	7.7			7.9
HARDNESS (Ca CO$_3$)								460	390			
COD						19	44	55	15			32
CHLORIDES (Cl)						80	642	443	514			361
SULPHATES (SO$_4$)						210	1720	1020	720			965
PHOSPHOROUS AS P	**Total**							.06	.16			
	Soluble							<.02	-			
NITROGEN (N)	**Total Kjeldahl**							2.1	.6			
	Free Ammonia							<.1	<.1			
	Nitrite							.04	.01			
	Nitrate							.1	2.6			
METALS	**Potassium (K)**		40.0						21			40
	Magnesium (Mg)								27			
	Calcium (Ca)								112			
	Sodium (Na)								560			
	Iron (Fe)		2.4	1.62	.62			1.92	.93			1.55
Phenol (ppb)		6	<1	3	1	<1	<1	<1	-			1.7
BOD			3.5	19	5.0	6.0	7.0	3.0	7.5			8.1
DOC or * Alkalinity			2.6	13.0	6.2				*167			7.3

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96 **TABLE** 6 **SHEET** 28

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 16 PIEZOMETER III

PROPERTY		Sept. 1979	Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	Apr.19 1981	Nov.24 1981				1979-80 Mean
CONDUCTIVITY µMHOS CM.		3550	5700	4050	3850	3970	4350	4400				4224
pH							-	7.5				
HARDNESS (Ca CO_3)							1580	1608				
COD							15	<10				
CHLORIDES (Cl)							186	214				
SULPHATES (SO_4)							3000	2500				
PHOSPHOROUS AS P	Total						.04	.18				
	Soluble						<.02	-				
NITROGEN (N)	Total Kjeldahl						3.2	2.2				
	Free Ammonia						2.2	<.1				
	Nitrite						.09	.62				
	Nitrate						.2	3.1				
METALS	Potassium (K)		35.0		28			33				32
	Magnesium (Mg)							109				
	Calcium (Ca)							464				
	Sodium (Na)							580				
	Iron (Fe)		52.0	2.05	3.0	.99	1.42	1.07				14.5
Phenol (ppb)		3	9	<1	<1	<1	<1	-				2.4
BOD			50.0	8.0	1.4	4.0	7.5	6.5				15.9
DOC or *Alkalinity			77	5.0	2.6	3.4		*52				22

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96 **TABLE** 6 **SHEET** 29

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 16 STANDPIPE IIII

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	Apr.19 1981	Sept.22 1981					1979-80 Mean
CONDUCTIVITY µMHOS / CM.		6100	1180	780	1350	950	1090					2353
pH						-	7.7					
HARDNESS ($CaCO_3$)						456	502					
COD						35	20					
CHLORIDES (Cl)						62	146					
SULPHATES (SO_4)						300	240					
PHOSPHOROUS AS P	Total					.67	.58					
	Soluble					<.02	-					
NITROGEN (N)	Total Kjeldahl					1.0	1.6					
	Free Ammonia					<.1	<.1					
	Nitrite					<.01	.01					
	Nitrate					<.1	.2					
METALS	Potassium (K)	19.0		2.9			3					11
	Magnesium (Mg)						40					
	Calcium (Ca)						134					
	Sodium (Na)						61					
	Iron (Fe)	4.4	11.0	8.0	8.00	66	21.6					7.9
Phenol (ppb)		1	16	3	1	<1	-					5.3
BOD		8.0	3.5	1.6	2.0	12	5.5					3.8
DOC or *Alkalinity			6.0	2.0	3.0		*282					3.7

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96 **TABLE** 6 **SHEET** 30

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 17 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM		19250	18750	22,000	20,000							19000
pH		7.1	7.02	-	7.4							7.1
HARDNESS (Ca CO_3)				6610	6540							
COD		1100	750	300	12							925
CHLORIDES (Cl)		8988	7656	8250	7975							8322
SULPHATES (SO_4)		960	1080	1260	1400							1020
PHOSPHOROUS AS P	Total			.11	.3							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			12	14							
	Free Ammonia			11	12							
	Nitrite			.01	.07							
	Nitrate			.5	.2							
METALS	Potassium (K)				190							
	Magnesium (Mg)				423							
	Calcium (Ca)				1920							
	Sodium (Na)				2660							
	Iron (Fe)			5.55	2.4							
Phenol (ppb)		<1	<1	16	-							<1
BOD		48	10	1.2	.2							29
Alkalinity					64							

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 31

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 17 STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY µMHOS CM.		21500	20075	22,000	20,250							20788
pH		7.3	7.11	-	7.0							7.2
HARDNESS (Ca CO_3)				5985	6100							
COD		680	610	240	12							645
CHLORIDES (Cl)		8664	8683	8000	7720							8676
SULPHATES (SO_4)		1220	1200	1175	1300							1210
PHOSPHOROUS AS P	Total			1.8	.22							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			12	4.8							
	Free Ammonia			9.8	12							
	Nitrite			.01	.01							
	Nitrate			.5	<.1							
METALS	Potassium (K)				92							
	Magnesium (Mg)				462							
	Calcium (Ca)				1680							
	Sodium (Na)				2900							
	Iron (Fe)			66	30.8							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		4.5	6.0	-	.2							5.3
Alkalinity					94							

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96

TABLE 6 **SHEET** 32

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 18 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM.		4200	3600	3700	3400							3900
pH		7.3	7.44	-	7.4							7.4
HARDNESS (Ca CO$_3$)				980	911							
COD		170	220	100	110							195
CHLORIDES (Cl)		974	933	880	497							954
SULPHATES (SO$_4$)		720	560	543	590							640
PHOSPHOROUS AS P	Total			.19	.08							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			5.8	5.0							
	Free Ammonia			5.2	4.9							
	Nitrite			.01	.03							
	Nitrate			<.1	.2							
METALS	Potassium (K)				85							
	Magnesium (Mg)				92							
	Calcium (Ca)				213							
	Sodium (Na)				435							
	Iron (Fe)			3.70	1.61							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		5.0	15.0	12	22							10
Alkalinity					337							

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96

TABLE 6 **SHEET** 33

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 18 STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM.		1500	1225	740	650							1363
pH		7.5	7.3	-	7.6							
HARDNESS (Ca CO$_3$)				341	334							
COD		61	27	15	13							44
CHLORIDES (Cl)		273	202	55	35							238
SULPHATES (SO$_4$)		155	160	104	84							158
PHOSPHOROUS AS P	Total			.36	.06							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			1.0	.4							
	Free Ammonia			<.1	<.1							
	Nitrite			.01	<.01							
	Nitrate			.8	.1							
METALS	Potassium (K)				11							
	Magnesium (Mg)				21							
	Calcium (Ca)				99							
	Sodium (Na)				16							
	Iron (Fe)			17	5.5							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		5.0	17.0	4	1.8							11.0
Alkalinity					279							

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96 **TABLE** 6 **SHEET** 34

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 19 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM		3600	3560	3900	3525							3580
pH		7.6	7.4	-	7.5							7.5
HARDNESS ($Ca\,CO_3$)				1040	1006							
COD		150	130	73	70							140
CHLORIDES (Cl)		620	824	790	680							722
SULPHATES (SO_4)		750	780	608	870							765
PHOSPHOROUS AS P	Total			.36	.08							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			5.8	4.6							
	Free Ammonia			4.0	4.3							
	Nitrite			.01	.01							
	Nitrate			.1	.1							
METALS	Potassium (K)				62							
	Magnesium (Mg)				94							
	Calcium (Ca)				248							
	Sodium (Na)				445							
	Iron (Fe)			10.2	2.7							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		3.5	7.0	5.0	10							5.3
Alkalinity					158							

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 6 **SHEET** 35

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS BOREHOLE 19 STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM.		1180	1170	1190	1130							1175
pH		7.7	7.6	-	7.7							
HARDNESS ($CaCO_3$)				460	444							
COD		47	25	29	25							36
CHLORIDES (Cl)		97	101	90	95							99
SULPHATES (SO_4)		210	200	233	260							205
PHOSPHOROUS AS P	**Total**			.84	.22							
	Soluble			<.02	-							
NITROGEN (N)	**Total Kjeldahl**			1.3	.4							
	Free Ammonia			.2	<.1							
	Nitrite			.1	.01							
	Nitrate			.9	1.2							
METALS	**Potassium (K)**				15							
	Magnesium (Mg)				43							
	Calcium (Ca)				107							
	Sodium (Na)				92							
	Iron (Fe)			33	10.8							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		3.0	3.5	4.0	9.0							3.3
Alkalinity					336							

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96 **TABLE** 6 **SHEET** 36

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 20 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Nov.24 1981							1980 Mean
CONDUCTIVITY μMHOS CM.		6800	6500	2150	1800							6650
pH		7.3	7.1	-	7.2							7.2
HARDNESS (Ca C O_3)				975	1127							
COD		130	90	69	60							110
CHLORIDES (Cl)		551	1414	143	171							983
SULPHATES (SO_4)		2200	2350	491	490							2275
PHOSPHOROUS AS P	Total			.38	.1							
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			1.9	1.0							
	Free Ammonia			<.1	.1							
	Nitrite			.01	.01							
	Nitrate			<.1	<.1							
METALS	Potassium (K)				9							
	Magnesium (Mg)				87							
	Calcium (Ca)				308							
	Sodium (Na)				55							
	Iron (Fe)			9.0	2.2							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		2.5	12	6.5	12							7.3
Alkalinity					581							

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96 **TABLE** 6 **SHEET** 37

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** BOREHOLE 20 STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr.19 1981	Sept.22 1981							1980 Mean
CONDUCTIVITY μMHOS CM.		2000	2150	2300	2225							2075
pH		7.0	6.6		6.7							6.8
HARDNESS ($CaCO_3$)				746	1158							
COD		220	73	105	45							146.5
CHLORIDES (Cl)		303	156	121	134							230
SULPHATES (SO_4)		190	300	500	560							245
PHOSPHOROUS AS P	**Total**			2.5	.1							
	Soluble			<.02	-							
NITROGEN (N)	**Total Kjeldahl**			3.2	1.0							
	Free Ammonia			<.1	.2							
	Nitrite			.01	.01							
	Nitrate			<.1	<.1							
METALS	**Potassium (K)**				5							
	Magnesium (Mg)				106							
	Calcium (Ca)				288							
	Sodium (Na)				55							
	Iron (Fe)			118	5.0							
Phenol (ppb)		<1	<1	<1	-							<1
BOD		9.0	14.0	4.5	19							11.5
Alkalinity					491							

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 80-96

TABLE 6 **SHEET** 38

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS RECHARGE WELL

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	Mar. 1980	April 1980					1979-80 Mean
CONDUCTIVITY μMHOS CM.			6400	5150	6850		5650					6013
pH												
HARDNESS (Ca CO_3)												
COD												
CHLORIDES (Cl)												
SULPHATES (SO_4)												
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl											
	Free Ammonia											
	Nitrite											
	Nitrate											
METALS	Potassium (K)			250								250
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)		640	100	25		1.4					191.6
Phenol (ppb)			340	750	750		675					629
BOD			435	640	540		580					549
DOC			268	500	475		460					426

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96-0

TABLE____ **SHEET**____

WATER ANALYSIS RESULTS

W13 (4667)

LOCATION Oakville Landfill Site

REMARKS Private Water Well - NW corner of 4th Line and Highway #5

PROPERTY			Sept. 22/81										
CONDUCTIVITY µMHOS/CM.			1260										
pH			7.7										
HARDNESS ($CaCO_3$)			488										
ALKALINITY ($CaCO_3$)			323										
CHLORIDES (Cl)			160										
SULPHATES (SO_4)			97										
PHOSPHOROUS AS P		Total											
		Soluble											
NITROGEN (N)	Total Kjeldahl		.2										
	Free Ammonia		<0.1										
	Nitrite		.02										
	Nitrate		1.5										
METALS	Potassium (K)												
	Magnesium (Mg)		43										
	Calcium (Ca)		124										
	Manganese (Mn)		.010										
	Iron (Fe)		.01										
BOD			0.4										
COD			12										
Phenols			<1										

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96-0

TABLE____ **SHEET**____

WATER ANALYSIS RESULTS

W14 (2138)

LOCATION Oakville Landfill Site

REMARKS Private Water Well - NE corner of 4th Line and Highway #5

PROPERTY		Sept. 22/81										
CONDUCTIVITY μMHOS / CM.		950										
pH		7.7										
HARDNESS (Ca CO_3)		476										
ALKALINITY (Ca CO_3)		312										
CHLORIDES (Cl)		34										
SULPHATES (SO_4)		93										
PHOSPHOROUS AS P	Total											
	Soluble											
NITROGEN (N)	Total Kjeldahl	.2										
	Free Ammonia	<0.1										
	Nitrite	<.01										
	Nitrate	17.5										
METALS	Potassium (K)											
	Magnesium (Mg)	38										
	Calcium (Ca)	128										
	Manganese (Mn)	.006										
	Iron (Fe)	.18										
BOD		0.4										
COD		15										
Phenols		<1										

NOTE: concentrations in p.p.m. unless otherwise noted.

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SURFACE WATER QUALITY ANALYSIS
RESULTS

ONTARIO MINISTRY Of The ENVIRONMENT
PROVINCIAL WATER QUALITY OBJECTIVES[1]
And DRINKING WATER QUALITY CRITERIA[2]
For The SUBSTANCES ANALYZED

Substance	Concentration
pH	6.5 - 8.5[1]
Dissolved Oxygen (DO)	>4 mg/L (minimum) dependent on temperature
Chloride (Cl)	250 mg/L[2]
Sulphate (SO_4)	250 mg/L[2]
Total Phosphorous (P)	0.03 mg/L[1]
Free Ammonia (N)	dependent on pH and temperature
Nitrate (N)	10 mg/L[2]
Iron (Fe)	0.3 mg/L[2]
Phenols	0.001 mg/L[2]

PROJECT 80-96

TABLE 7 **SHEET** 1

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** SW. 1

PROPERTY / DATE		JUNE 11 1979	April 1980	Feb. 1981	Apr.19 1981	May 21 1981	Sept.21 1981	Nov.20 1981				
CONDUCTIVITY μMHOS/CM.		465	344	402	580	590	980	452				
pH		7.9		7.5			7.5	7.4				
HARDNESS (Ca CO_3)		181		137	243	240	220	195				
COD				21	23	30	17	25				
CHLORIDES (Cl)		34		56	68	64	108	39				
SULPHATES (SO_4)		33		55	71.5	72	95	83				
PHOSPHOROUS AS P	**Total**			.06	.1	.02	.04	.08				
	Soluble			<.02	<.02	<.02	<.02	<.02				
NITROGEN (N)	**Total Kjeldahl**	1.0		0.8	.6	.6	.1	1.0				
	Free Ammonia			<.1	<.1	.1	<.1	<.1				
	Nitrite			<.01	<.01	.01	<.01	.02				
	Nitrate			2.8	<.1	<.1	<.1	1.5				
METALS	**Potassium (K)**	3.5					4.0	4.1				
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)	25					142	21				
	Iron (Fe)	1.2	.41	.31	.1	.36	.34	.34				
	Phenol (ppb)	< 1	<1	<1	<1	<1	-	-				
	BOD	3.0	1.4	.4	1.4	3.0	.4	.8				
	DOC or*Alkalinity		9.1				*305	*97				

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 7 **SHEET** 2

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS SW.2

PROPERTY	DATE	JUNE 11 1979	April 1980	Feb. 1981	Apr.9 1981	May 21 1981	Sept.21 1981	Nov.20 1981				
CONDUCTIVITY μMHOS/CM.		740	486	600	1200	1340	1850	530				
pH		7.8		7.4			7.9	7.8				
HARDNESS ($CaCO_3$)		304		250	504	540	810	227				
COD				25	42	40	113	30				
CHLORIDES (Cl)		60		83	176	186	296	45				
SULPHATES (SO_4)		38		65	89	78	54	79				
PHOSPHOROUS AS P	**Total**			.04	.06	.02	.08	.08				
	Soluble			<.02	.20	<.02	<.02	<.02				
NITROGEN (N)	**Total Kjeldahl**	1.8		1.2	1.0	.4	6.0	.8				
	Free Ammonia			.6	.6	<.1	3.6	<.1				
	Nitrite			.03	.01	.04	.05	.02				
	Nitrate			2.4	<.1	.1	.1	1.4				
METALS	**Potassium (K)**	7.6					26	4.0				
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)	38					162	23				
	Iron (Fe)	3.1	.48	.78	.64	1.5	2.60	.43				
Phenol (ppb)		< 1	<1	<1	<1	<1	-	-				
BOD		4.0	3.0	3.5	.8	5.0	8.0	.6				
DOC or *Alkalinity			10.6				*701	*119				

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 80-96

TABLE 7 **SHEET** 3

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS SW 3

PROPERTY / DATE		JUNE 11 1979	Feb. 1981	Apr.9 1981	May 21 1981	Sept.22 1981	Nov.20 1981					
CONDUCTIVITY μMHOS/CM.		840	560	2000	1760	2050	710					
pH		7.9	7.5			7.7	8.0					
HARDNESS (Ca CO_3)		323	211	695	664	748	287					
COD			21	105	80	85	50					
CHLORIDES (Cl)		71	69	268	307	270	78					
SULPHATES (SO_4)		56	65	125	77	77	88					
PHOSPHOROUS AS P	**Total**		.08	.20	.04	.08	.08					
	Soluble		<.02	<.02	<.02	<.02	<.02					
NITROGEN (N)	**Total Kjeldahl**	1.8	2.0	16	.4	4.4	1.0					
	Free Ammonia		1.2	11.8	<.1	2.2	<.1					
	Nitrite		.01	.05	1.0	1.45	.04					
	Nitrate		.7	.1	1.2	7.5	1.1					
METALS	**Potassium (K)**	10.7					9					
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)	44					42					
	Iron (Fe)	6.0	1.72	6.80	2.1	.24	1.1					
Phenol (ppb)			<1	<1	<1	-	-					
BOD			1.4	14	6.5	42	3.5					
Alkalinity						480	170					

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96

TABLE 7 **SHEET** 4

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS SW 4

PROPERTY		Feb. 1981	May 21 1981	Nov.20 1981								
CONDUCTIVITY μMHOS/CM.		640	4250	720								
pH		7.3		8.0								
HARDNESS (Ca CO_3)		236	1220	287								
COD		50	640	50								
CHLORIDES (Cl)		50	475	55								
SULPHATES (SO_4)		65	28	80								
PHOSPHOROUS AS P	Total	.1	.52	.06								
	Soluble	<.02	<.02	<.02								
NITROGEN (N)	Total Kjeldahl	6.0	94	5.4								
	Free Ammonia	5.4	85	<.1								
	Nitrite	.02	.04	.17								
	Nitrate	.2	.2	.3								
METALS	Potassium (K)			13.4								
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)			44								
	Iron (Fe)	4.25	60	2.4								
Phenol (ppb)		<1	7									
BOD		5.5	45	1.2								
Alkalinity				210								

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96

TABLE 7 **SHEET** 5

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE **REMARKS** SW 5

PROPERTY		Apr. 1980	Feb. 1981	Apr.9 1981	May 21 1981	Sept.22 1981	Nov.20 1981					
CONDUCTIVITY μMHOS/CM.		8600	640	1020		980	640					
pH			7.8			8.1	8.3					
HARDNESS (Ca CO$_3$)			248	426	396	480	280					
COD			27	<10	12	23	30					
CHLORIDES (Cl)			83	130	106	132	61					
SULPHATES (SO$_4$)			65			83	76					
PHOSPHOROUS AS P	**Total**		.06	.02	.02	.04	.04					
	Soluble		<.02	<.02	<.02	<.02	<.02					
NITROGEN (N)	**Total Kjeldahl**		1.4	.8	.4	.6	.8					
	Free Ammonia		.6	<.1	<.1	<.1	<.1					
	Nitrite		.03	.01	.02	.02	.08					
	Nitrate		1.6	.6	.4	.3	1.3					
METALS	**Potassium (K)**					9.7	6.3					
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)					25.5	32					
	Iron (Fe)	28	.54	.07	.16	.18	.48					
Phenol (ppb)		<1	<1	<1	<1	-	-					
BOD		5.5	1.8	.4	6.0	.6	1.2					
Alkalinity						273	173					

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96

TABLE 7 **SHEET** 6

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS SW 6

PROPERTY		Oct. 1980	Dec. 1980	Feb. 1981	Apr.9 1981	May 21 1981	Sept.22 1981	Nov.20 1981				
CONDUCTIVITY μMHOS/CM.		670	770	485	690	640	540	600				
pH		8.4	8.3	8.0			8.5	8.4				
HARDNESS (Ca CO$_3$)		283	329	220	289	264	240	280				
COD		30	<10	21	<10	15	27	25				
CHLORIDES (Cl)			87	41	67	72	44	47				
SULPHATES (SO$_4$)				40	55	46	47	51				
PHOSPHOROUS AS P	**Total**	.02	.04	.08	.02	.06	.04	.06				
	Soluble		<.02	<.02	<.02	<.02	<.02	<.02				
NITROGEN (N)	**Total Kjeldahl**	.6	.6	.8	.8	.4	.6	.8				
	Free Ammonia	<.1	<.1	<.1	<.1	<.1	<.1	<.1				
	Nitrite			.02	.02	.02	.02	.02				
	Nitrate	.8	2.3	1.7	1.4	.6	.6	1.0				
METALS	**Potassium (K)**						2.8	4.7				
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)						27	24				
	Iron (Fe)	.14	.60	1.10	.06	.05	.20	.7				
Phenol (ppb)		<1	1	<1	<1	<1	-	-				
BOD		0.2	1.4	1.6	2.0	1.0	.6	2.0				
Dissolved Solids		410	485									

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 80-96

TABLE 7 **SHEET** 7

WATER ANALYSIS RESULTS

LOCATION OAKVILLE LANDFILL SITE

REMARKS SW 7

PROPERTY		Oct. 1980	Dec. 1980	Feb. 1981	Apr.9 1981	May 21 1981	Sept.22 1981	Nov.20 1981				
CONDUCTIVITY µMHOS/CM.		670	770	480	670	640	550	600				
pH		8.4	8.2	8.0			8.4	8.4				
HARDNESS (Ca CO$_3$)		282	330	218	285	268	236	282				
COD		15	39	19	<10	25	10	25				
CHLORIDES (Cl)			86	41	66	73	44	47				
SULPHATES (SO$_4$)				35	51.5	50	47	58				
PHOSPHOROUS AS P	**Total**	.02	.04	.06	.02	.08	.04	.04				
	Soluble		<.02	<.02	<.02	<.02	<.02	<.02				
NITROGEN (N)	**Total Kjeldahl**	.6	.6	.8	.6	.4	.6	.8				
	Free Ammonia	<.1	<.1	<.1	<.1	<.1	<.1	<.1				
	Nitrite			.02	.02	.02	.02	.03				
	Nitrate	.8	2.3	1.7	1.4	.6	.6	1.0				
METALS	**Potassium (K)**						2.9	4.7				
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)						21.5	24.5				
	Iron (Fe)	.37	.25	.66	.06	.04	.13	.8				
Phenol (ppb)		<1	1	<1	<1	<1	-	-				
BOD		0.4	1.6	1.2	1.2	2.0	.4	2.0				
Dissolved Solids		420	505									

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

SURFACE WATER BACTERIOLOGICAL ANALYSES

Table 8

Sheet 1

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml)

SURFACE WATER STATION SW1 OAKVILLE LANDFILL SITE

	Feb.26/81	Apr.9/81	May 21/81	Nov.20/81	1981 Geometric Mean								
Total Coliforms	1800	A420	A9400	4600	2391								
Coliform Background	5700	4700	25,500	13,000	9707								
Fecal Coliforms	<10	140	A50	A20	34								
Fecal Streptococci	100	A70	250	120	120								
Pseudomonas Acruginosa	A10	<4	<4	<10	<10								
Pseudomonas Background	<10	<4	<4	<10	<10								

Table 8

Sheet 2

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml)

SURFACE WATER STATION SW2 OAKVILLE LANDFILL SITE

	Feb. 26/81	Apr. 9/81	May 21/81	Nov. 20/81	1981 Geometric Mean								
Total Coliforms	2100	1500	A600	4000	1658								
Coliform Background	7900	10,900	102,000	8300	16,431								
Fecal Coliforms	<10	1070	240	A70	116								
Fecal Streptococci	720	>1500	340	250	550								
Pseudomonas Aeruginosa	110	<4	<4	<10	12								
Pseudomonas Background	70	<4	16	<10	15								

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml) Table 8

SURFACE WATER STATION SW3 OAKVILLE LANDFILL SITE Sheet 3

	Feb. 26/81	Apr. 9/81	May 21/81	Nov. 20/81	1981 Geometric Mean								
Total Coliforms	4100	A600	A1000	7000	2037								
Coliform Background	25,000	44,000	104,000	20,000	38,892								
Fecal Coliforms	A30	<10	<10	A90	23								
Fecal Streptococci	490	340	1280	280	494								
Pseudomonas Aeruginosa	<10	<10	<4	<10	<10								
Pseudomonas Background	<10	<10	<4	<10	<10								

Table [illegible]
Sheet 4

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml)
SURFACE WATER STATION SW4 OAKVILLE LANDFILL SITE

	Feb. 26/81		May 21/81	Nov. 20/81	1981 Geometric Mean								
Total Coliforms	A6900		A9000	6200	7275								
Coliform Background	34,000		1400000	33,000	116,224								
Fecal Coliforms	A30		<10	A40	23								
Fecal Streptococci	150		>1500	280	398								
Pseudomonas Aeruginosa	<10		<10	<10	<10								
Pseudomonas Background	<10		<10	<10	<10								

Table 8

Sheet 5

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml)

SURFACE WATER STATION SW5 OAKVILLE LANDFILL SITE

	Feb. 26/81	Apr. 9/81	May 21/81	Nov. 20/81	1981 Geometric Mean									
Total Coliforms	2300	<20	A150	3900	405									
Coliform Background	24500	2220	8600	8900	8032									
Fecal Coliforms	A90	<10	<10	A30	23									
Fecal Streptococci	450	<10	A40	120	68									
Pseudomonas Aeruginosa	<10	<4	<4	<10	<10									
Pseudomonas Background	<10	<4	<4	<10	<10									

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml)
SURFACE WATER STATION SW6 OAKVILLE LANDFILL SITE

Table 8
Sheet 6

	Dec. 5/80	Feb. 26/81	Apr. 9/81	May 21/81	Nov. 20/81	1981 Geometric Mean							
Total Coliforms	1700	3100	A40	A300	23,000	962							
Coliform Background	10,500	5800	6800	92,000	38,000	19,270							
Fecal Coliforms	A50	A10	<10	<10	160	20							
Fecal Streptococci	740	A40	A10	<10	580	39							
Pseudomonas Aeruginosa	A60	<10	<4	<4	A10	<10							
Pseudomonas Background	130	<10	<4	<4	A10	<10							

Table 8
Sheet 7

SURFACE WATER BACTERIOLOGICAL ANALYSES (Counts per 100 ml)
SURFACE WATER STATION SW7 OAKVILLE LANDFILL SITE

	Dec. 5/81	Feb. 26/81	Apr. 9/81	May 21/81	Nov. 20/81	1981 Geometric Mean
Total Coliforms	1300	2700	A10	A100	22000	493
Coliform Background	16000	5000	8100	33500	48000	15,975
Fecal Coliforms	A90	<10	<10	<10	120	19
Fecal Streptococci	590	A50	<10	<10	550	41
Pseudomonas Aeruginosa	A40	<10	<4	<4	<10	<10
Psuedomonas Background	220	<10	<4	<4	<10	<10

APPENDIX III

AQUATIC MACROINVERTEBRATES

Appendix III: Aquatic Macroinvertebrates collected from East Oakville Creek and its tributary in the vicinity of the Oakville Landfill. (September 13, 1981)

SPECIES	Station									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MAYFLIES										
Baetidae		*				*	*			
Leptophlebiidae						*	C			
Stenonema						*	*			
CADDISFLIES										
Hydropsychidae					C	*	D			
Unident. 'A'						*	*			
Unident. 'B'					*					
DAMSELFLIES										
Unident.		*								
BEETLES										
Dytiscidae					*					
Unident. adult					*					
FLIES										
Chironomidae		*	*			*				
Culicidae		C								
Simuliidae					*					
AMPHIPODS										
Unident.							*			
CLAMS										
Pisidium						*				
Sphaerium		*								
SNAILS										
Helisoma						*				
Physa		*								
LEECHES										
Erpobdellidae						*				
continued ...										

NOTES

Appendix III: Sheet 2

SPECIES	Station									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
WORMS Tubificidae		D								
TOTAL NO. TAXA	-	7	1	-	4	9	6			

NOTES